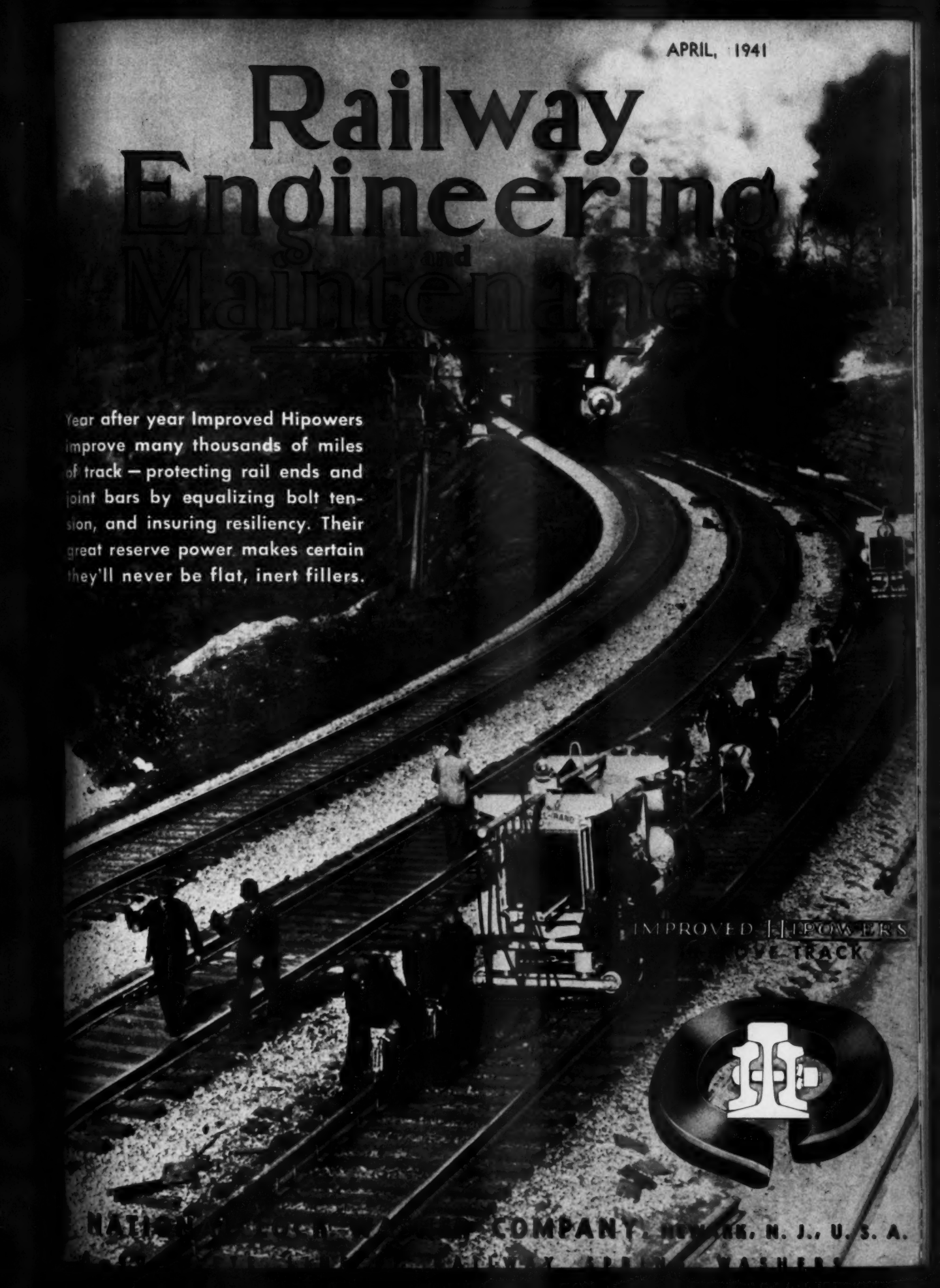
APRIL, 1941

Railway Engineering and Maintenance

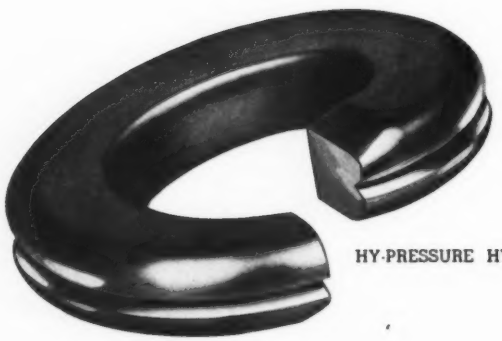


Reliance HY-CROME *Spring Washers*

LOCOMOTIVE HY-CROME

LEADERSHIP

The HY-CROME family includes twelve different types of spring washers, one to cope with every track joint or mechanical problem. Maximum non-fatiguing tension per square area of steel can only be achieved through modern fabricating and heat-treating methods. Approach your bolt problem from a scientific basis.



HY-PRESSURE HY-CROME

A HY-CROME SPRING WASHER FOR EVERY BOLT PROBLEM

HY-CROME
Pressure Spring

HY-CROME *Springlocks*
Patent Applied For

EATON MANUFACTURING COMPANY
RELIANCE SPRING WASHER DIVISION
MASSILLON, OHIO, U. S. A.

Sales Offices: **New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal**

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the postoffice at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago, Ill.

BANISH "Maintenance Blues"

THIS EASY, LOW-COST WAY

1

2

3

When maintenance expense gets out of hand here is a simple, practical answer. Have your own crew replace old structures with ARMCO Multi Plate Pipe or Arches. They can do the work in a few days, often without interrupting traffic. Then maintenance costs return to normal.

ARMCO Multi Plate meets every railroad requirement for modernizing old or failing structures. It has ample strength to exceed load specifications with a wide margin of safety. The easily handled, corrugated sections are shipped in convenient knocked-down form, ready for immediate assembly. Unskilled men just bolt them together, then backfill and the job is done. No power equipment, no troublesome curing. Naturally costs are low and work is finished quickly.

Why not end recurring maintenance by replacing weak or inadequate structures with ARMCO Multi Plate. You can do this at low cost and with complete confidence in the strength and durability of the finished job. Write for the facts. Armco Railroad Sales Co. Inc., 1241 Curtis Street, Middletown, Ohio.

1. **A budget-buster is on the skids. Constant repairs were needed to keep this timber trestle in shape; so railroad officials decided to end the trouble once and for all by installing a modern ARMCO Multi Plate structure.**

2. **The railroad's regular maintenance men installed the sturdy, corrugated iron plates easily and quickly without power equipment. Hand wrenches were the only tools needed for assembly and work went forward smoothly.**

3. **The job is done and excess maintenance is out! A durable, low-cost structure installed in a few days without interrupting traffic. Temporary struts will be removed as soon as the fill has reached final settlement.**

ARMCO MULTI PLATE

A PRODUCT ORIGINATED AND DEVELOPED BY ARMCO ENGINEERS

PREVENT

Costly

RAIL JOINT CORROSION

The beginning of the end of rail joint corrosion.

RMC PLASTIC Blocks are shipped in convenient cartons sufficient for one joint.

R.M.C. PLASTIC assures COMPLETE RAIL JOINT PROTECTION, and effects savings in time and money that you can hardly afford to overlook . . . especially these days when heavier maintenance programs demand greater attention of your available forces.

R.M.C. PLASTIC is a metal preserving and lubricating compound —furnished in moulded blocks that are easily applied to the inner face of joint bars before bolting to the rail in the usual manner. As the bars are drawn into place, the entire interior of the joint area is SOLIDLY PACKED and the threads of bolts and nuts perfectly coated with Plastic, assuring lifetime protection against the entry of all corrosion agencies.

Intervals between joint renewals are greatly extended—service-life of rail is increased—kinks and humps due to "frozen" joints are eliminated.

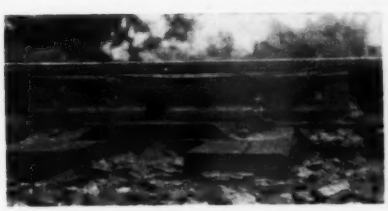
Showing method of placing RMC moulded blocks on joint bars before application to rail.

With a busier year in prospect—and economy the watchword, get in touch with a RAIL JOINT COMPANY representative or write us direct for complete information.

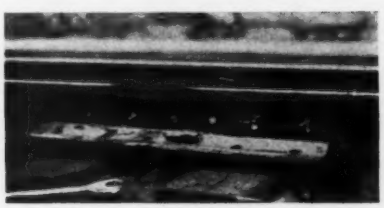
RAILWAY MAINTENANCE CORP.

PITTSBURGH, PENNSYLVANIA

The joint bars are applied in the conventional manner, as shown above.

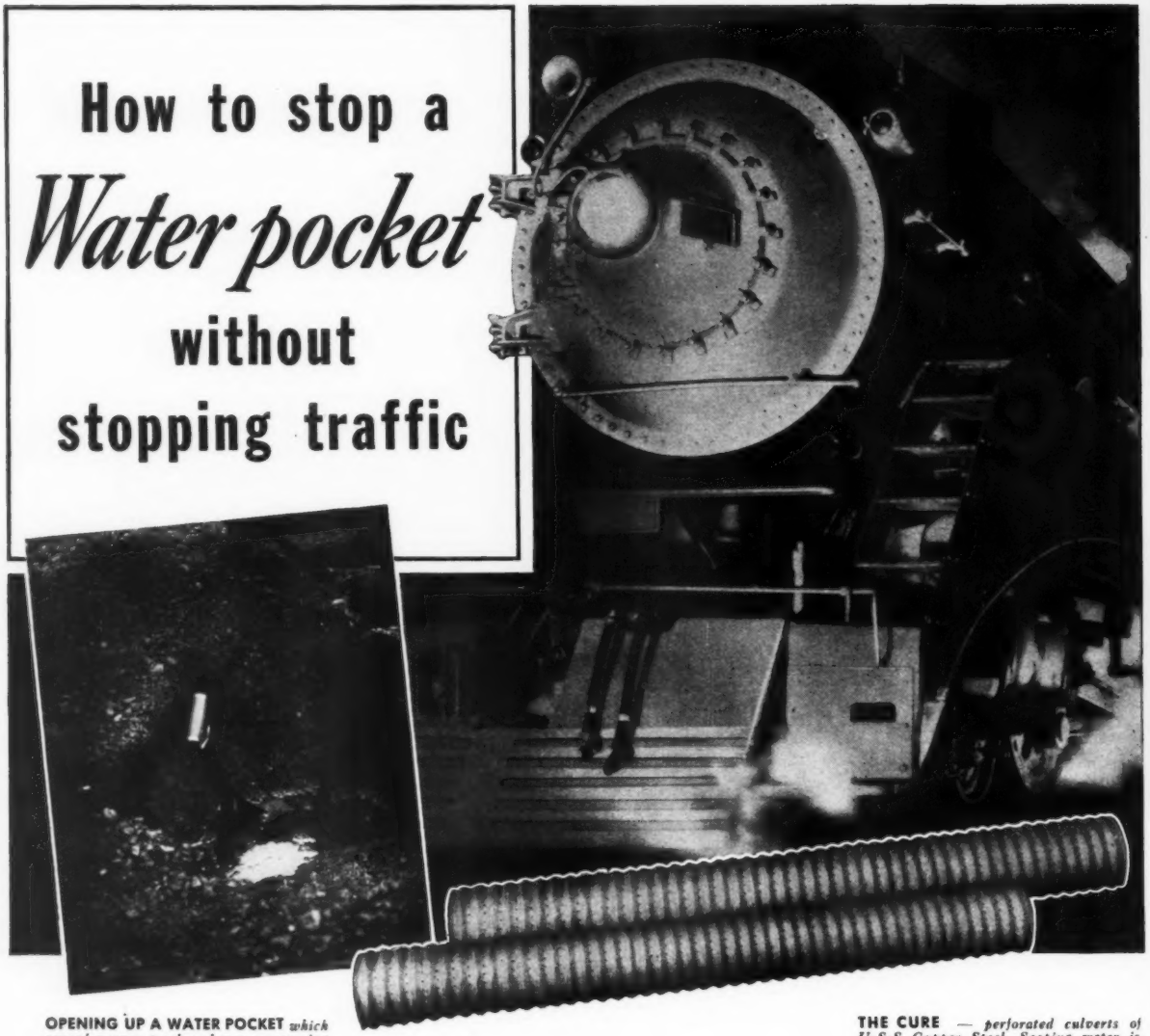


This joint was packed in 1930 and the above photograph was taken eight years later—1938.



Showing the joint at the left, with splice removed eight years after packing with RMC Plastic. The rail, joint, bolts and nuts were completely free from corrosion.

How to stop a *Water pocket* without stopping traffic



OPENING UP A WATER POCKET *which caused uneven track and was a recurring source of maintenance expense.*

THE CURE — *perforated culverts of U·S·S Copper Steel. Seeping water is quickly removed, does not form a pocket.*

WET spots that may look like mere trickles often develop into water pockets. Then the roadbed gets soft, and expensive maintenance work is necessary.

On jobs like this, perforated metal culverts offer a quick and inexpensive cure for the trouble. They can be jacked under the track in most cases without slowing down a single train. This method of solving the problem with metal culverts saves much expense and prevents time wasting "slow orders."

Galvanized corrugated culverts of U·S·S Copper Steel are furnishing low-cost drainage under the nation's most heavily travelled railroads. They have the strength to withstand heavy, pounding loads and the stamina to resist vibration. Uneven soil pressures from rapid freezes and sudden thaws are absorbed by the flexible corrugated construction.

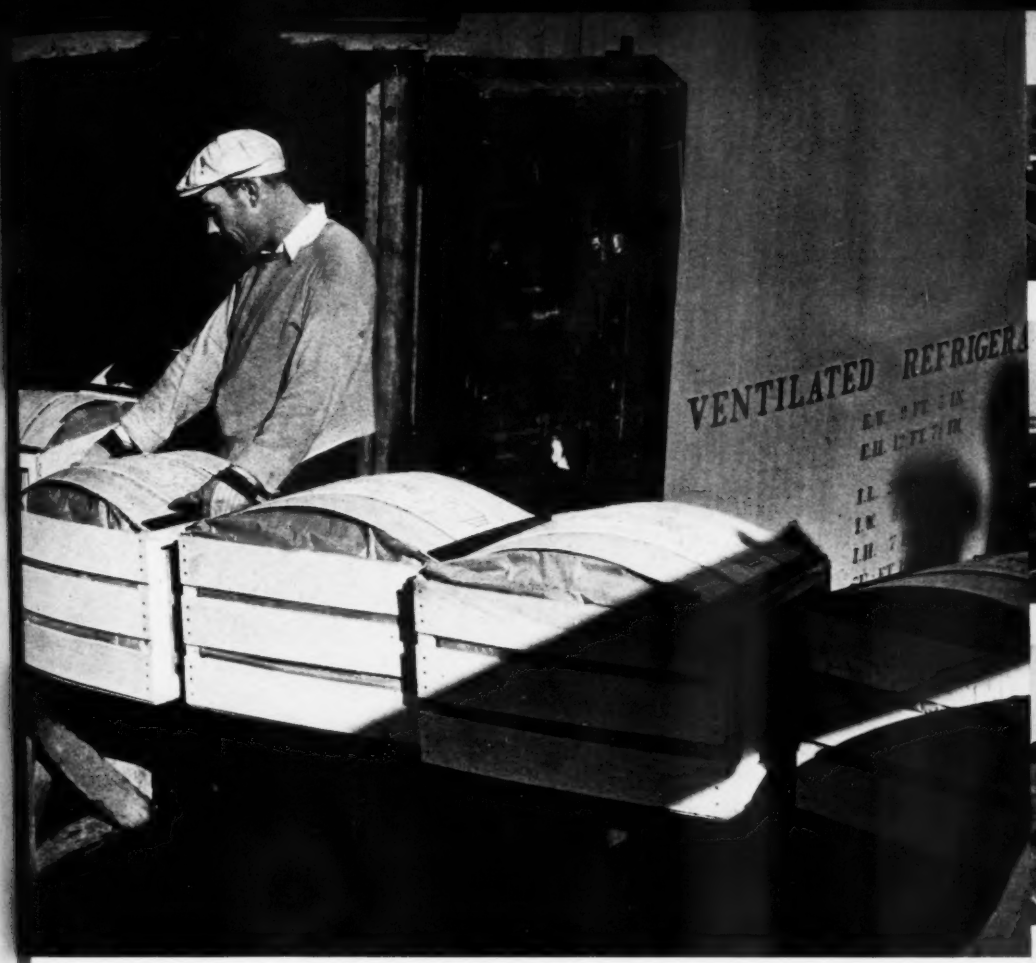
There's a dependable source of supply near you for culverts, sectional plate arches, perforated pipe and other drainage products made of U·S·S Steel. Write for the name of our fabricator in your territory.

U·S·S GALVANIZED CULVERT SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
Scully Steel Products Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

USS

UNITED STATES STEEL



FAIRMONT M9 SERIES C, 1 to 2 man inspection car

FAIRMONT S9 SERIES C car in signal maintenance work

FAIRMONT A6 SERIES C, 85 H.P. engine, for heaviest extra gang work

FAIRMONT M19 SERIES D in track supervisor's service

FAIRMONT M14 SERIES D for all light section service

FAIRMONT S2 SERIES E in standard section wor

CARS THAT CARRY NO FREIGHT

Help Speed Perishables to Market

Lettuce and citrus fruits from Florida and California, melons from Arizona, bananas from the Carribean and countless other perishables from fertile fields and orchards thousands of miles away, are rushed daily to city dwellers via fast freight. The high speeds, at which these express trains operate, are possible not only because of improvements in locomotives and rolling stock but also because of modern methods of road maintenance. Here Fairmont Railway Motor Cars, by providing time-saving, dependable transportation of men, materials and tools, play an important part in maintaining the safe track and roadbed that are so essential for the high speed trains. By reducing the cost of maintenance, they have made fast trains more profitable. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

FAIRMONT S2 SERIES F. Seats 1 to 8 men. Hauls 24,000 lbs., yet is light enough for two men to use easily.

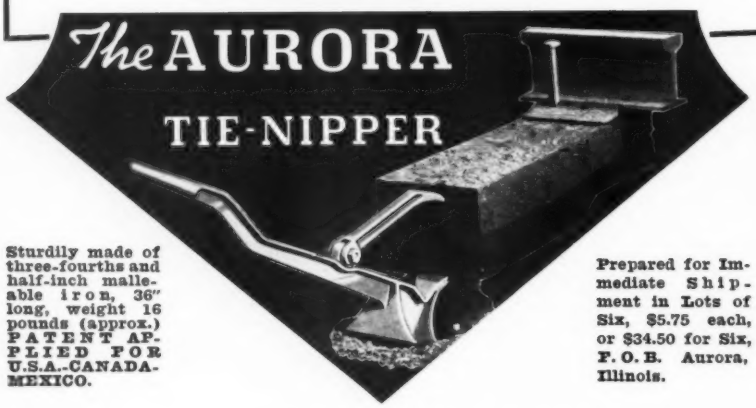
Fairmont
RAILWAY MOTOR CARS

Performance
ON THE JOB
COUNTS

FARSIGHTEDNESS *wins* VICTORIES *over* COSTS

As the National Defense Program gets under full steam there will be an increasing premium on manpower; of course, the need for reducing operating costs is ever-present.

The AURORA TIE-NIPPER



Sturdily made of three-fourths and half-inch malleable iron, 36" long, weight 16 pounds (approx.) PATENT APPLIED FOR U.S.A.-CANADA-MEXICO.

Prepared for Immediate Shipment in Lots of Six, $5.75 each, or $34.50 for Six, F. O. B. Aurora, Illinois.

The AURORA TIE-NIPPER is simple, practical and easy to use.

The rapidly growing demand for ***Aurora Tie-Nippers*** is a tribute both to the alertness of the railroads to progressive improvement in method and to the simple, practical value of our product.

If you haven't put the ***Aurora Tie-Nipper*** to the acid test of service in the field, we urge you to buy a set of six. Place them in the hands of your surfacing gangs at separated points. In this way you will obtain independent opinions. We are confident you have ahead of you a pleasant surprise in the form of a MAJOR OPERATING SAVING created by an extremely modest investment. It's a simple matter of mathematics—a $5.75 ***Aurora Tie-Nipper*** replaces the wages of one man ($833.44—saved during a 9 months maintenance season).

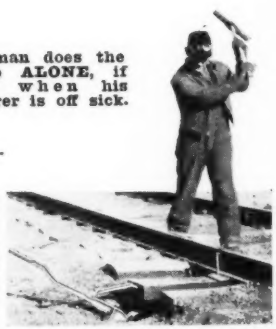
The Foreman and ONE laborer do the Tamping and Spiking.

PROMOTE SAFETY • REDUCE MAN POWER • CUT COSTS

THE OLD WAY • The Foreman works with TWO laborers. He holds the lining bar while his TWO laborers do the spiking; he holds or sits on the lining bar while his TWO laborers do the tamping. Three men are required; only TWO are really productive. Flying spikes and maul chips, posterior injuries from sitting on the lining bar are a constant hazard.

THE NEW WAY • An ***Aurora Tie-Nipper*** is on the job. The gang consists of the Foreman and ONE laborer. The Tie-Nipper is set. The Foreman and his ONE laborer do the spiking and tamping. The time of ONE man has been SAVED. The hazards of flying spikes and maul chips and possible injury from sitting on the lining bar have been eliminated.

The **JUNIOR AURORA TIE-NIPPER**, specially designed for the B & B departments, enables the man working on deck of bridge to do his own nipping of ties or bridge stringers with the assistance of a helper.



The Foreman does the entire job ALONE, if necessary, when his ONE laborer is off sick.

Order a lot of six. Distribute them among your surfacing gangs for opinions of different individuals.

Price is non-retroactive and subject to change without notice.

AURORA
RAILWAY SUPPLY CO.
AURORA . . . ILLINOIS

PREPARE for THIS

BUSY YEAR the FASTER EASIER BETTER WAY

End Section of Old Tie that has been removed. Note undisturbed crib and compact bed on which new tie will rest.

WOOLERY TIE CUTTERS

will speed-up your tie renewal program weeks—possibly months—ahead of the normal schedule.

As a time-saver . . . labor-saver . . . and MONEY SAVER . . . the WOOLERY Tie Cutter is a most practical aid to track men.

Especially THIS YEAR . . . with increased traffic, higher train speeds, greater interference with track work and greater demands on available forces, *you need* a better way to handle your heavier track maintenance program.

Get your tie renewals out of the way far ahead of schedule and release your forces for other work that will face you the remainder of the year.

PUT TO WORK ON YOUR ROAD a machine that has proved beyond question . . . in the renewal of more than 2,000,000 ties on roads from coast to coast . . . that it cuts time and cost 30% or more.

You can readily get the facts FIRST-HAND if you will let us demonstrate on your road.

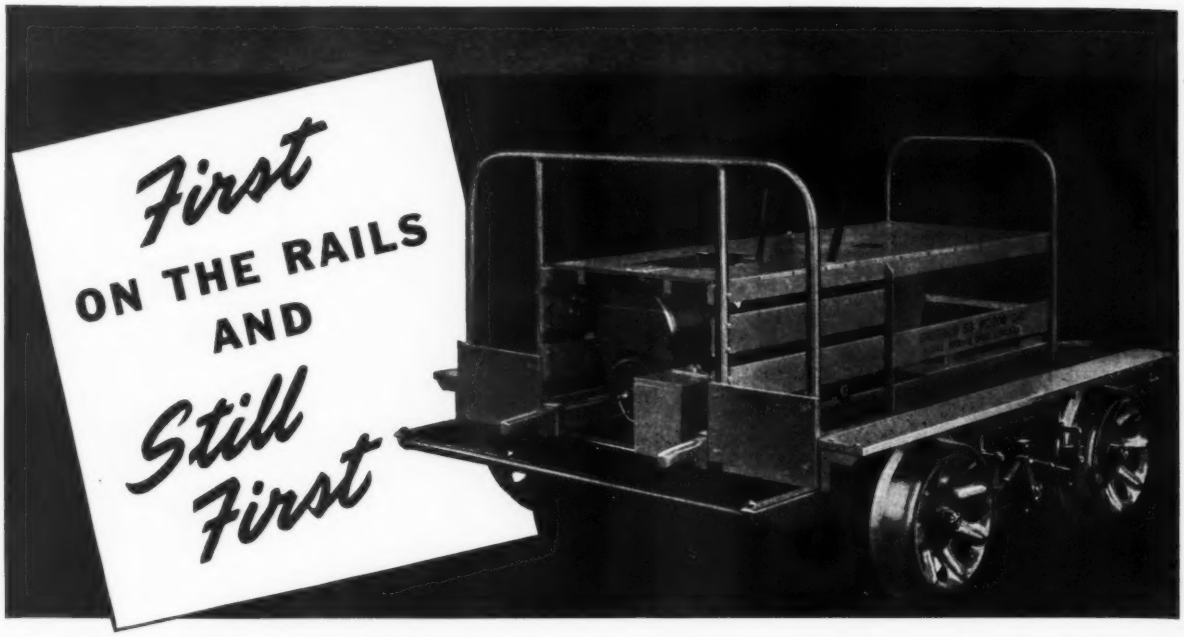
WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS • SWITCH HEATERS • MOTOR CARS

RAILWAY WEED BURNERS • BOLT TIGHTENERS



Sheffield Motor Car, Model 53

FOR A FULL SECTION CREW AND THEIR TOOLS

HERE'S the newest model in a famous line—a lightweight standard section car weighing only 929 pounds.

Despite its capacity, the new Sheffield 53 is light enough *for one man to handle.* 125-pound rear end lifting weight. And it is sturdy, safe, powerful, and *dependable.*

Not just one or two good features recommend it to you . . . it has good design and rugged, precise construction throughout. Thus it fully maintains the standards that have kept Sheffields the leaders since the day 44 years ago when Sheffield introduced motor cars to railroading.

There's a full line of Sheffield Motor Cars for every railroad need. Write for complete details and specifications. Fairbanks, Morse & Co., Dept. D70, 600 S. Michigan Ave., Chicago, Ill.

• • •

Instruction books and parts lists on any Fairbanks-Morse railroad equipment will gladly be sent on request.

• **ENGINE**—water-cooled, horizontal, single-cylinder, two-cycle, reversible type, with air-cooled cylinder head. Eight h.p., but actually develops 13-brake horsepower. Air cooling of head results in evaporating 20% less water than similar engines with water-cooled head, while operating temperature is reached more quickly. Water hopper around cylinder cast integrally with cylinder; crankcase cast separately. Piston of special aluminum alloy and cast-iron skirt. Crankshaft mounted in two Timken roller bearings. HOLLEY carburetor, well known to maintainers. Five-gallon gas tank. Flexible gasoline tube with fuel filter. Split-type spring blade timer with condenser.

• **PATENTED CLUTCH**—Will withstand slipping and cannot be burned out in operation.

• **CHAIN DRIVE**—Long recognized as a superior and highly efficient drive. The best type for emergency use in deep snow and high water. No trouble from grit and moisture from the roadway.

• **AXLE BEARINGS**—Alemite-fitted Timken tapered roller bearings.

• **WHEELS**—Patented, electric-welded, one-piece wheels. No separate parts.

• **DIFFERENTIAL FRONT AXLE,** rail skids, two-way lifting handles, and safety railings are standard equipment.

TIMKEN BEARING EQUIPPED

D102-RA21.133

FAIRBANKS-MORSE

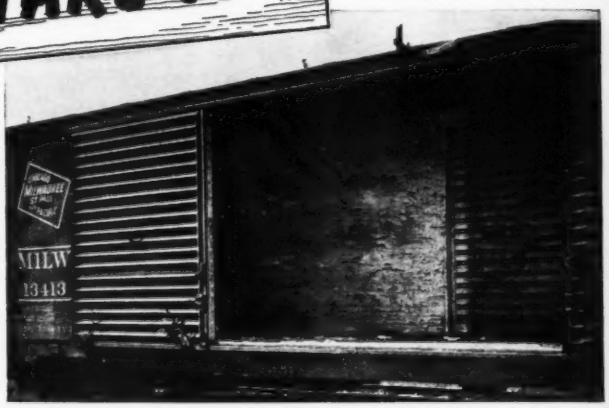
DIESEL ENGINES
PUMPS
ELECTRICAL MACHINERY
FAIRBANKS SCALES
RAILROAD EQUIPMENT
WATER SYSTEMS
WASHERS-IRONERS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS

F M

Railway Equipment

DOUGLAS FIR PLYWOOD CAN REALLY "TAKE IT"

● This automobile car, one of 2000 built by the Milwaukee road, has been in constant service for 4 years, yet the Douglas Fir Plywood lining has had absolutely no repairs in that time. Although scratched, the plywood has not been punctured.



You'll find this "Modern Miracle in Wood" better for scores of jobs!

● When you want a material to do a "man's job" . . . when you want toughness, strength, rigidity, puncture-proofness, large size . . . specify Douglas Fir Plywood.

This amazing "wood and glue sandwich" is already preferred for scores of railroad jobs, and new uses are being discovered regularly. Douglas Fir Plywood is equally adaptable to both new construction and modernizing. In both, it saves time and labor, gives better service at lower cost.

Douglas Fir Plywood is manufactured in strict accordance with U. S. Commercial Standard CS45-40. Two basic types, Exterior and Moisture Resistant, are made in a variety of grades, sizes and thicknesses. Each is "grade trade-marked" to make identification positive and specification easy. For more information or technical assistance, write Douglas Fir Plywood Association, Tacoma Building, Tacoma, Washington.

STATION BUILDINGS PLYWALL builds puncture-proof walls and ceilings. 3/8" recommended, but economical 1/4" adequate for new construction or covering cracked plaster. 5/16" PLYSCORD recommended for wall sheathing. 5/16", 3/8" or 1/2", depending on rafter spacing and roof load, for roof decking under shingles, tile, composition roofing, etc. 1/2" or 5/8" for sub-flooring.

Specify EXT-DFPA for exterior siding of buildings, refrigerator cars and other uses where permanently waterproof adhesive is required. 3/8" or 1/2" recommended. More details in free Dri-Bilt Manual and Grade Use Guide.

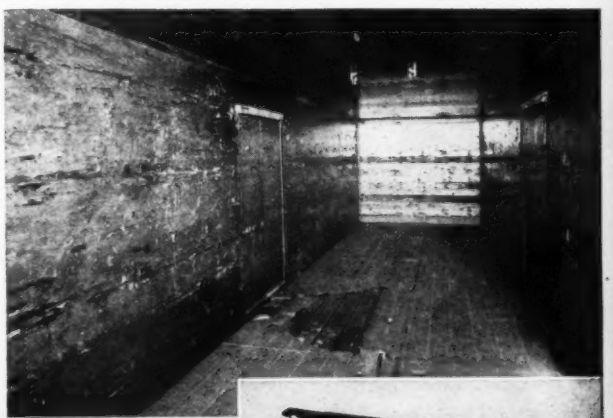
Specify PLYPANEL for finest paneling, cabinets, furniture; for partitions where both sides are exposed to view.

CAR LINING 3/4" PLYPANEL (SO2S) most widely used for freight and baggage car lining. PLYFORM grade also popular. 5/16" PLYPANEL for ceilings. PLYPANEL (G1S or G2S) for fine paneling in passenger cars. Write for specific recommendations.

CONCRETE FORMS PLYFORM, either 5/8" or 3/4", is ideal concrete form material. Gives numerous re-uses, satin-smooth surfaces. Free Manual gives full details.

● Douglas Fir Plywood is ideal for interior walls, ceilings and counters. It is permanently crack-free, makes rooms warmer and wind-proof, can be bent to pleasing curves. Linoleum laid over a Douglas Fir Plywood sub-floor never shows unsightly board marks—gives better service.

● *Below:* Although moisture, ice and kegs defaced interior appearance of all-plywood St. Louis Refrigerator Car Co. beer car, 4153, in 1 year of use, damage is only on surface and plywood lining is as serviceable as when new. Exterior walls and roof are EXT-DFPA, the type of Douglas Fir Plywood made with water-proof glue for permanent outdoor use.



GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D.F.P.A. INSPECTED

GENUINE PLYWALL Douglas Fir Plywood WALLBOARD D.F.P.A. INSPECTED

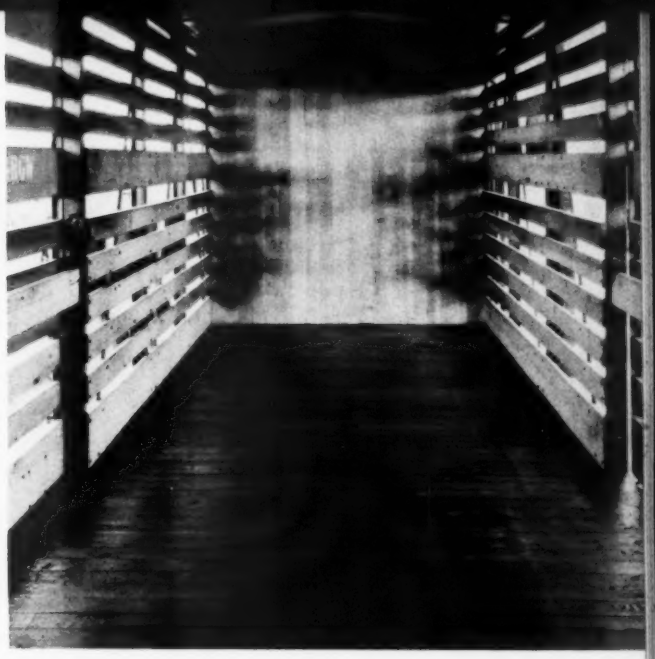
SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

PLYPANEL D.F.P.A. TRADE MARK REG. U. S. PAT. OFF.

EXT.-D.F.P.A. TRADE MARK REG. U. S. PAT. OFF.

GENUINE PLYSCORD SHEATHING D.F.P.A. INSPECTED

DOUGLAS FIR PLYWOOD · Real Lumber MADE LARGER, LIGHTER SPLIT-PROOF STRONGER



Pressure-Creosoted WOOD DECKS

boost service life and cut mechanical failures in 100 new Rio Grande Stock Cars

To increase service life, reduce mechanical failures, and save in repair shop costs, decks of creosoted wood were used in the single-deck stock cars recently constructed by the Denver and Rio Grande Western R.R. Conditions found in stock cars are very conducive to decay. Experience indicates that pressure-creosoted lumber has several times the life of untreated decking.

Lumber treated with creosote has increased resistance to wear and abrasion, and is water-repellent. It eliminates many "mechanical" failures that are actually induced by decay. We will be glad to give you added information on this money-saving application, if you will write.

PRESSURE-CREOSOTED WOOD CAN SAVE FOR YOU HERE:

1. Car Lumber
2. Cross Ties
3. Bridge Materials
4. Freight and Storage Buildings
5. Poles
6. Platforms

WOOD PRESERVING DIVISION
KOPPERS COMPANY
PITTSBURGH • PENNSYLVANIA

use **KOPPERS** *products*

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

Fill out and mail

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1046, SEC. 510 P. L. & R., PITTSBURGH, PA.

KOPPERS COMPANY
7004 Koppers Building
Pittsburgh, Pa.

Is your waterproofing *Waterproof?*

Strange as it may seem, some materials which are used for waterproofing cannot resist the deteriorating action of water.

When you put on waterproofing it is usually in an inaccessible place. It costs a lot of money to replace it. You have to be sure it can resist water.

One of the qualities that coal tar pitch possesses in a superlative degree is its ability to resist continuous exposure to water. There are abundant records to support this fact. It is also not adversely affected by sub-soil conditions.

Use Koppers Coal Tar Waterproofing Pitch and Koppers Tar-Saturated Fabric, properly installed, and you can be sure that water will not seep through your bridge decks, that your foundations will not leak, that your retaining walls and similar structures will be able to resist water.

Send for the Koppers data sheets on waterproofing and dampproofing.

KOPPERS COMPANY

Tar and Chemical Division

7004 KOPPERS BUILDING · PITTSBURGH, PA.

use **K O P P E R S** *products*

KOPPERS COMPANY
7004 Koppers Bldg., Pittsburgh, (22) Pa.

Please send me the information checked:

Name.....

Title.....

Company.....

Address.....

- ☐ "Pressure-Treated Timber for Railroad Cars"
- ☐ "Pressure-Treated Poles"
- ☐ "Pressure-Treated Laminex Culverts"
- ☐ "Locomotive and Valve Cylinder Packing"
- ☐ "Ring Set-ups for Diesel Engines"
- ☐ "Koppers Industrial Coals"
- ☐ "How to Build Steep Roofs with Coal Tar Pitch"
- ☐ "Roofing Specifications"
- ☐ "Waterproofing Specifications"
- ☐ "Dampproofing Specifications"
- ☐ "Bituminous Base Paints"
- ☐ "Koppers Creosote Coal Tar Solutions"
- ☐ "Koppers Creosote"
- ☐ "Coal Tar Disinfectants"

Fill out and mail

Increased traffic—higher speeds—and more heavily loaded cars in 1941, will materially increase the problem of maintaining rails and joints at the proper level. BARCO Unit Tytampers will greatly relieve this added burden. Being self-contained and easily carried by one man—means *More time* "on the job" —maximum production from the operators—inevitable cost reduction—and *well tamped track that retains surface and alignment longer.*

Initial capital expense is lower and year-around performance in tamping, crib busting and ice breaking, adds to their efficiency.

FIVE YEARS SATISFACTORY SERVICE
NOW USED BY 72 RAILROADS

BARCO Tytampers may also be operated from a small light-weight central power plant for out of face tamping, as shown above. This unit, weighing less than 100 lb., and costing less than $100, is supplying power to 12 BARCO Tytampers.

Spot tamping at busy terminals and crossings is quickly and easily handled—no auxiliary equipment in the way.

BARCO MANUFACTURING COMPANY
1805 W. Winnemac Ave. NOT INCORPORATED Chicago, Illinois
In Canada THE HOLDEN COMPANY, LTD.
Montreal — Moncton — Toronto — Winnipeg — Vancouver

This unretouched close-up shows a section of the bridge girder cover plate that has been flame-cleaned (right) adjacent to a section still to be done (left).

OXY-ACETYLENE FLAME-CLEANING
Helps Combat Costly Corrosion

• Oxy-acetylene flame-cleaning removes loose paint, scale, and rust from steel surfaces and at the same time drives out surface moisture. After the flame-cleaned surface has been wire brushed, the protective coating of paint is applied while the metal is still warm and dry. Paint then spreads more quickly and evenly and bonds more tightly to the steel from which flame-cleaning has eliminated the major causes of subsequent corrosion and paint flaking. Oxweld representatives help the railroads determine where and how this process can be used profitably.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York

OXWELD RAILROAD SERVICE

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

The word "Oxweld" is a registered trade-mark of a Unit of Union Carbide and Carbon Corporation.

No. 148 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

April 1, 1941

Subject: Two Anniversaries

Dear Reader:

In 1911, Italy declared war on Turkey and seized Tripoli; she lost it in 1941. Also Spain and France had trouble over Morocco.

In 1911, the shop crafts employees on the railroads of the United States attempted to form a Federation of Shop Trades. Strike threats collapsed when the Federation became involved in jurisdictional disputes.

In 1911, William Howard Taft was president—work on the Panama Canal was rapidly approaching completion—the trust-busting campaign of Theodore Roosevelt was waning—women were agitating for equal suffrage—and the country was looking forward to the Bull Moose campaign of 1912.

And in 1911 (May), the first Maintenance of Way Section of the Railway Age (the predecessor of Railway Engineering and Maintenance) appeared—initiating a specialized service to the more than a quarter million officers and employees engaged in the improvement and upkeep of the tracks and structures of the railways in America and throughout the world.

In 1916, Charles Evans Hughes retired one night confident that he had been elected president of the United States, only to find two days later that Woodrow Wilson had been re-elected in a "photo finish" with the campaign slogan, "He kept us out of war." The following year we entered the war.

In 1916, General John J. Pershing was sent into Mexico at the head of an American expeditionary force to capture and punish the bandit leader, Pancho Villa. He returned empty-handed.

In 1916, the English navy decisively defeated that of Germany in the battle of Jutland and drove it back to its base. It remained there until the close of the war.

In 1916, the four railway train service brotherhoods threatened to strike and tie up transportation throughout the country. Congress passed and President Wilson signed the Adamson Act, reducing the basic day for these employees from 10 to 8 hours.

And in 1916 (June), Railway Engineering and Maintenance first appeared within its own cover, having emerged from the Maintenance of Way Section, in the third weekly issue of each month, of the Railway Age, to give supervisory maintenance officers a magazine edited for them, talking their language and devoted solely to their problems.

1941 marks two anniversaries for Railway Engineering and Maintenance which will be recognized in the June issue by a review of the progress made in materials, equipment and methods, as portrayed month by month in our columns during the period of greatest change and development that the railways, and the world, have ever experienced.

Yours sincerely,

Elmer T. Howson

ETH:EW

Editor

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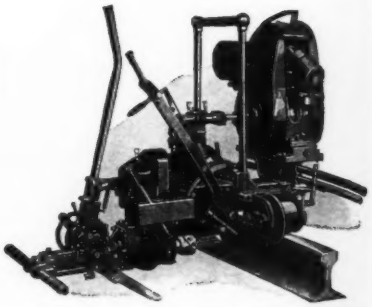
For drilling bolt holes the most for your money comes in the *Everett Power M-W Machine*



The Everett requires but **one** rail for its full operation. It can be quickly freed and tilted off the rail by **one** man.

It clamps **either** over the angle bars or to rail without angle bars. In either position, clamping is **positive.**

When drilling rail through angle bar hole, the drill can be aligned with hole, which constitutes a template, and then the machine can be **positively clamped** in position for drilling the rail.

With the Everett a **clear view** can be had of the template hole or prick punch marking without operator working on his knees.

The vertical adjustment of thé machine is now operated by a **ratchet,** which raises or lowers the **entire** machine. **Exact** adjustments are **quickly** made.

The Everett can be **rapidly** clamped to and released from the rail. A spirit level is attached to the machine for leveling on tangent track.

A force feed oiling device **lubricates** the cutting edges of the bit.

For feeding the bit the rack and pinion principle is utilized. **Fifteen years of experience** have proved that there are **no bad mechanical reactions** to this method. It has been completely successful.

It is essential that the operator should have the **"feel"** of the bit as it works, in order that he may relieve the pressure and thus avoid ruining bits as they cut through the tough skin.

The **feel** of the bit is **definitely there** in the Everett machine. It helps to determine when bits require sharpening and **avoids** excessive strain on thrust bearings or machine frame, which might be caused by forcing the feed of dull bits.

To keep the machine **out** of the repair shop and to drill to the best advantage, bits must be sharp. For reasons enumerated above, bits remain sharp **longer** on the Everett machine.

Fifteen years of development and satisfactory use have proved the Everett M-W Machine **correct** in design and construction. It is built for **hard** and **continuous service.**

Even a **substantial** difference in cost is **quickly offset** by service interruptions and repair jobs.

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Railway Engineering and Maintenance

Another Waterway

President Pushes St. Lawrence Channel

UNDER the guise of a national defense project, although it is not proposed that it be completed until 1945, President Roosevelt has submitted to Congress an agreement drawn with Canada that contemplates the construction of a 27-ft. channel, in place of the present 14-ft. channel, from Lake Ontario to the Atlantic Ocean. The Administration is throwing the full weight of its influence behind this project on the ground that it will provide added transportation facilities from the Northwest to the sea. It is essentially the same proposal that was submitted to Congress in 1934 in the form of a treaty with Canada which failed to receive the necessary two-thirds approval of the United States Senate. In the form in which it is now submitted, it requires only a majority vote of each house of Congress to become effective, so far as this country is concerned.

Of Concern to Railway Employees

Although this proposal is less than a week old at the time that this editorial is written, it has developed a great division of opinion. Especially affected are railway employees. With their ranks already reduced more than a half million persons by the diversion to other forms of transportation of a large amount of the traffic that they formerly handled, they are now threatened with this further serious inroad in the movement of freight from the Middle West to Atlantic Coast points and for export. It is because of this fact that six railroad labor organizations have expressed open opposition to the project and are opposing it in Congress and elsewhere with all the power at their command.

What Is the Need?

The St. Lawrence waterway proposal is vulnerable from several standpoints. In the first place, there is no demand for additional transportation facilities in this area. On the contrary, there is a large surplus of facilities and further construction will only add to the surplus. It was to avoid waste of funds through the construction of duplicate facilities that Congress inserted in the Transportation Act of 1940 a provision for the creation of a Transportation Study Board whose function would be to study the need for transportation facilities and report thereon before expenditures therefor were approved.

The delay of the President in complying with this provision is interpreted by some as an attempt to keep the St. Lawrence River project out of the hands of this Board because of its vulnerability from this standpoint, since he did not appoint this Board until March 20, or six months after the signing of the Act creating it, and two days after he had made public announcement of his proposal for the St. Lawrence waterway.

What Will It Cost? For Whose Benefit?

Aside from the lack of need for the project, it is pertinent to consider its cost. In his statement submitted to Congress on March 21, the President fixes this at $266,000,000, of which $206,000,000 is to be advanced by the United States; other estimates have fixed the total cost as high as $1,220,000,000. And the President's huge figure does not include many "extras" that may be added later. Nor does it take into consideration the cost of harbor improvements that will be necessary to accommodate vessels of deeper draft.

Even with these exceptions, the President's figure is not to be taken too seriously, for projects of this character have a habit of overrunning their estimates greatly. The Chicago Drainage Canal, for illustration, was estimated to cost $16,000,000; it actually cost $53,000,000. The advance estimate of the cost of the Panama Canal was $160,000,000; the actual cost was $375,000,000. And the Welland Canal in Canada cost $131,000,000, as compared with the original estimate of $50,000,000. With such precedents, it becomes anyone's guess what the cost of the St. Lawrence waterway will reach, once started.

And for whose benefit will the waterway be built? It is contended by its proponents that it will benefit the western farmer by lowering the cost of transporting his grain to Europe. This was one of the principal arguments advanced in favor of the expenditure of large sums for the deepening of the channels in the Missouri and the upper Mississippi rivers. Yet the farmers in those areas have yet to see the slightest effect on the prices they receive for grain. Rather, such savings as are affected in transportation costs accrue solely to those through whose hands the grain passes after it leaves the farmers. And the same conclusion has been reached by the Food Research Institute of Stanford University with regard to the St. Lawrence waterway, concerning which

it reported after careful investigation that "even from the standpoint of the proponents of the St. Lawrence seaway a good case cannot be made out for benefit to American wheat growers."

Who Will Suffer?

Already the full force of propaganda is being directed at the center of opposition to this project in the Middle West, pointing to the great expansion of ship building facilities that will occur on the Great Lakes but ignoring the corresponding and inevitable decline that will occur in railway employment and in the employment of builders of cars and locomotives and of other railway materials. As pointed out by the executives of the railway labor organizations, "every foreign ship entering or leaving an American port with a cargo means the elimination of trains at the rate of 1,000 tons per train and every elimination of the operation of a train will reduce wage payments to the highest type of labor in the world. Every such reduction will be a blow to the economic stability of the United States."

The time has come for action. Every railway employee should exert himself in opposition to this latest waterway project as a further threat to his position and as a menace to the economic welfare of the community and country to which the railways make such a large contribution.

Station Modernization

Renovation vs. New Construction

MUCH is being said these days about passenger station modernization. The American Railway Bridge and Building Association has studied and reported on it, numerous articles have been published concerning it, and, within the last month, the Building committee of the American Railway Engineering Association has taken up the subject for investigation and report. As yet, however, relatively little has been actually done about it, although indications are that, in view of the unquestioned need for the modernization of many stations, this subject, before long, will command much the same attention that is now being accorded the modernization of passenger train equipment.

It is a logical sequence on those roads that have received outstanding recognition for their high-speed, streamlined trains, that at least their most important stations, serving as the gateways to these trains, should be given consideration in this regard. Where there is the need and this has not been done, the reaction upon those boarding or leaving the luxury, attractiveness and comfort of these newer trains is naturally adverse.

This situation is not being ignored by railway managements, and it is to be expected that just as soon as earnings will permit, more passenger stations will be modernized. In fact, with the prospects for increased earnings by the railways better than they have been for some years, it is most likely that station modernization work will soon assume larger proportions.

The outlook for this class of work places large responsibility on railway engineering and maintenance officers, and particularly those in charge of building work. This responsibility has to do not alone with the architectural and utilitarian features of the stations involved, but with their economic aspects as well. In meeting this responsibility, many difficulties will be encountered. To please all parties concerned will present difficult problems in itself, since ideas as to what constitutes the most effective modernization are frequently as numerous as the number of people consulted. But still more important often are the economic questions involved—the relative cost of modernization, through renovation and outright replacement through new construction.

All too generally, modernization implies overhauling —the renovation of the interior or exterior, or both, usually combined with refurnishing, to the total neglect of achieving the results desired through outright new construction, even where this may prove better adapted and more economical. All too common, also, is the belief that renovation work, almost regardless of the conditions presented, costs only a fraction of comparable new construction. That this belief is frequently erroneous has been demonstrated in many cases. This was brought out clearly in the report of a committee presented before the American Railway Bridge and Building Association in 1930, on the Modernization of Station Buildings. This report, containing data submitted by 15 roads in various parts of the country, showed that while three roads reported that the investment involved in remodeling stations on their roads had been less than it would have been if entirely new buildings of similar size and design had been constructed, six roads reported that their investment in remodeled stations had equalled that that would have been required for new buildings of similar size and design, and six other roads reported that their investment in remodeled stations had been greater than would have been required to provide entirely new structures of comparable size and design.

As in the case of the individual home owner who seeks to retain the original lines and weathered effects in an old structure, regardless of costs, it is conceivable that the renovation of an old passenger station can be justified at a cost equal to or in excess of that for an entirely new structure. However, under ordinary conditions, it is recognized that, assuming the achievement of the desired results in appearance and utility, the factor of cost must be controlling.

Unquestionably, as has been demonstrated time and time again, certain types of stations lend themselves to effective modernization through renovation, particularly of their interiors, at much smaller cost than would be involved in a complete rebuilding project. At the same time, modernization through renovation can be carried out frequently with less interference with the normal handling of passengers than where rebuilding is undertaken, especially if reconstruction is to be on the same site. On the other hand, it is an established fact that renovation work, with the larger labor costs involved in alteration and patchwork than in straight construction with new materials, and often involving extensive repairs uncovered during the course of the work, can cost far in excess of original estimates, this cost often approaching or exceeding that of entirely new facilities of comparable size and design. Furthermore, the modernization of certain buildings through renovation, because of their location, shape or size, might, in the light of the many changes that have taken place in station require-

ments in recent years, perpetuate features in these old structures that are out of keeping with present needs.

It is obvious, therefore, that station modernization involves factors of economics and utilitarian value, as well as appearance. These additional factors are often difficult to appraise accurately, and are frequently more difficult to explain to those unacquainted with building problems and costs. However, with enlarged programs of station modernization confronting the railways, it is the responsibility of building officers to appraise carefully the relative costs and advantages of renovation and new construction in the case of each individual project considered, and to present their findings to their superior officers in a clear and convincing manner. In many cases, the facts may prove a shock to those uninformed in building work, but, in the interest of final results and economy, building men must point out the facts in each individual case as they find them and be prepared to stand behind their recommendations based thereon.

Scrap

An Added Incentive for Picking Up

IT has often been said that a foreman who does his work neatly almost invariably does it well and that an untidy foreman is generally a poor workman. Neatness, as it is understood in maintenance, goes beyond being neat about the work immediately in hand; it involves keeping tracks and right of way clear of scrap, rubbish, unsightly piles of material, the repair of fences, the straightening of signs and mile posts and the control of vegetation, particularly through station grounds. Obviously, with the restricted appropriations for maintenance and the limited forces that it has been possible to employ in recent years, some of these items have not been under the control of the section forces. One of these items, the collection of scrap, has remained in their control, however.

While the disposal of all rubbish is important, not only from the standpoint of good housekeeping but also to eliminate hazards of fire and personal injury, the collection of scrap has always been of special importance, for scattered scrap is an economic waste and, under some conditions, as in yards, may become a serious hazard. Every gang engaged in the maintenance of track, bridges, buildings and water service should be trained to gather up all of the scrap it has accumulated during the day and any other that may be found in the immediate vicinity of its work.

In addition to that which results from the work of these gangs, there is generally a considerable volume of material to be found on any section, that works loose and falls from cars and locomotives, and may include such tools as scoops, slash bars and fire rakes from locomotives. Obviously, much of this material will remain usable, provided it is collected and shipped promptly to a central point where it can be sorted and reclaimed.

At present, in addition to the ordinary reasons why scrap should be gathered up currently, there is now another and urgent incentive for doing this. We are bending every effort to organize production to insure maximum output for defense purposes. While there have not as yet been any serious shortages of metal, every ounce of metal that is allowed to remain idle where it cannot be reclaimed, contributes to this possibility, and as production increases metals will be needed in larger quantities. Therefore, from both the economic and the patriotic standpoints, scrap should not be overlooked. All items should be gathered up currently and sent as quickly as practicable to the stores department for disposal.

Anti-Creepers

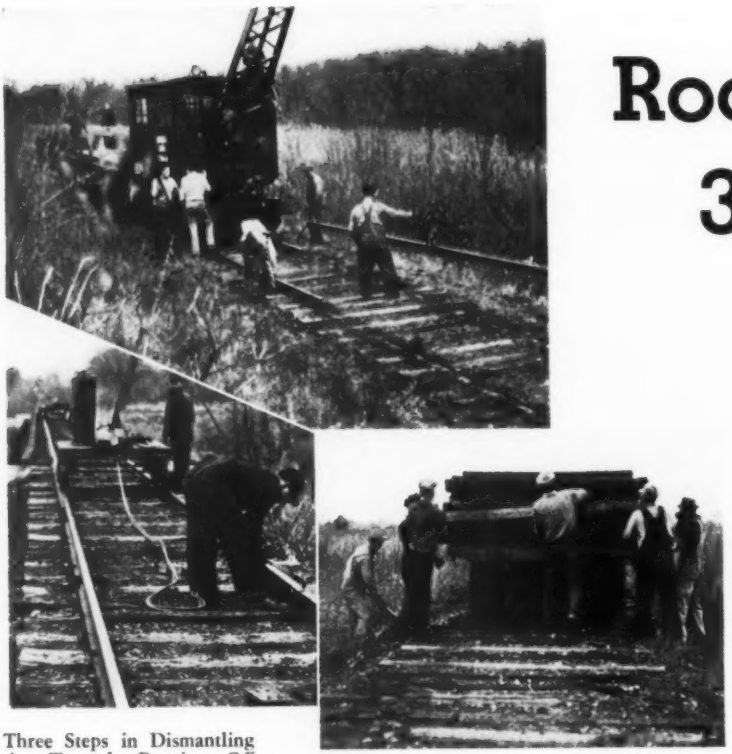
An Advantage in Yard Tracks

SOME diversity of opinion prevails with respect to the use of anti-creepers in yard tracks. Some experienced maintenance men believe that there is the same justification for their use there as in main tracks; others oppose their use on the ground that the benefits do not justify the expense, and that in any event, creeping rail in yards does not create the same hazards as in main tracks; while still others would limit their use to pull-in and departure tracks.

There are tracks in every yard in which the rail never creeps, and these can be dismissed from consideration; in others creepage may be persistent and aggravated. When rail creeps, in either main or yard tracks, it must be driven back, the ties must be straightened and, in many cases considerable surfacing is necessary. Furthermore, this is a recurring expense, for if rail starts to creep, it becomes increasingly difficult to hold it in place. Since all of this effort can be avoided by an adequate application of anti-creepers, the labor involved becomes an economic waste, and this waste is emphasized by the fact that the cost of the anti-creepers is less than that of reconditioning the track.

To what tracks should they be applied? Obviously, the answer is, to any track in which the trail shows a tendency to creep. This usually includes incoming and outgoing leads, the tracks in arrival and departure yards, hump tracks and ladders. It may also include classification tracks, for skates and the one-way movement through these tracks sometimes causes the rail to run rather badly. It is particularly important that they be placed in ladder tracks, on both the through and turnout rails and for some distance back of the frogs on the turnout side; otherwise it may be difficult to maintain line and gage at the frogs, or to keep the switch rods from binding on headblocks or ties. Such application will perceptibly reduce wear on all parts of the turnout.

Tie conditions are rarely as good in yard tracks as in main tracks; in general, second-hand rail is used for yard purposes, and it is seldom that fishing wear and joint batter are corrected when the rail is laid, as is done when rail is relaid in main tracks. Again, even today, many yard tracks do not have tie plates and, where they do, spiking is seldom up to main-track standards. It is true that the normal speeds are much lower and that the hazards resulting from rail creepage are less, but satisfactory standards of track construction and maintenance, as well as considerations of economy, warrant the equipping with anti-creepers of any track in which creepage is occurring.



Three Steps in Dismantling the Track—Burning Off Track Bolts; Removing the Rail; and Loading Out Old Serviceable Ties By Truck

Road Built in 33 Years

Recently, the Chicago, Burlington & Quincy dismantled 139.21 miles of the single-track Quincy, Omaha & Kansas City railroad in Missouri, involving 28 steel bridges, 11,525 lin. ft. of timber bridge structures and many buildings, with multiple, well-organized forces, in record time and at low cost. This article describes the methods employed, which, incorporating several special features, proved most effective

WHEN the Chicago, Burlington & Quincy dismantled 139.21 miles of the single-track main line of its Quincy, Omaha & Kansas City Railroad in Missouri recently, it set new records in speed and economy for such operations on the Burlington, which are attributable in large part to several new and effective expedients employed in the work. As the result of the methods employed, the complete facilities on this section of line, which included 28 steel structures, 11,525 lin. ft. of timber bridges and trestle approaches, and more than 50 buildings of various types, were removed in approximately half the time originally estimated, and at unit costs substantially below those obtained in the most efficiently conducted previous work of a similar character on the Burlington.

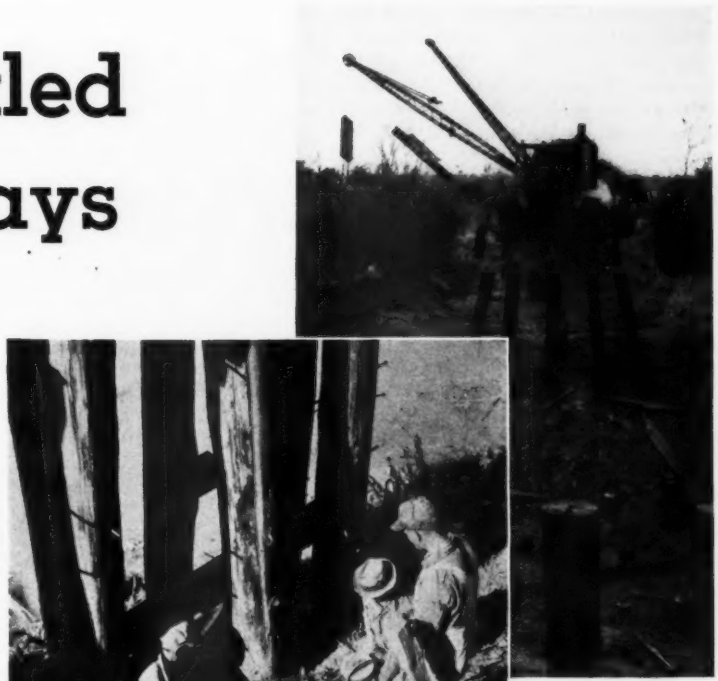
Some of the outstanding features of the methods employed were the unusually careful programming of all operations in advance; the careful organization of both the track and bridge removal forces, with their operations so synchronized as to cause minimum delay to one another and thereby maximum progress of the work as a whole; the effective use made of power tools and equipment to speed up the dismantling work; the removal of all usable crossties under contract, by means of motor trucks, entirely independent of the bridge and rail removal organizations; and the salvaging or sale of practically everything on the right-of-way, including rails, ties, station buildings and their appurtenances, steel bridges, bridge timbers and pilings, telegraph poles, cinder ballast, stock pens and water tanks, and reinforced concrete and cast iron culvert pipe. Through these various methods and expedients, the greatest net salvage value was secured from every class of material on the abandoned property and the work as a whole on all portions of the line was completed in 98 working days.

Features of the Line

The Quincy, Omaha & Kansas City Railroad was a consolidation of a number of predecessor companies; it was built in the years 1870 to 1903 and extended from Quincy, Ill., through Milan, Mo., to North Kansas City, Mo., with a total of 244.31 miles of owned and 248.45 miles of operated main line. Built largely in the interest of opening up a large agricultural and stock raising country, it proved profitable for a number of years, but, since early in the Thirties, that portion extending from Milan, through Trenton, Pattonsburg, Osborne and Trimble, to North Kansas City, a distance of 139.21 miles, proved a serious liability, primarily through the loss of traffic to other forms of transportation. Thus resulted the application for the abandonment of this section of the line with subsequent approval by the Interstate Commerce Commission.

This line had an undulating grade with many sags and summits, with a ruling grade eastward of 1.27 per cent and about the same westward. The alinement was not particularly unfavorable, although it included more than 160 curves, 44 of which were 4 deg. or sharper. The track throughout was laid with 60 to 90-lb. rail, about 46 per cent being of 75-lb. section, and the ties, 6-in. by 8-in. by 8-ft. long, were largely treated, about one-half being equipped with tie plates. The ballast generally was of cinders. Of the 28 steel bridges on the line, all of which were designed for Cooper's E-65 loading, 10 were truss spans. The 11,525 ft. of timber bridges and trestle approaches to steel spans were generally of the five-pile bent type, with three 8-in. by 16-in. stringers beneath each rail. Buildings on the line, which were located primarily at stations, included 25 depots of various types and sizes, 28 stock pens, numerous section and miscellaneous station grounds buildings of various types of construction, 3 water tanks and 1 frame coaling chute.

— Dismantled in 98 Days



Removing Timber Bridge Decks With Two Full Revolving Cranes and Cutting Off Piles With a Chain Saw

Following the receipt of approval for abandoning the line, but prior to any dismantling work, a careful field inspection was made by representatives of the operating, engineering and maintenance of way departments to obtain first-hand information as to the condition of the different elements of the track, bridges and buildings, and also to obtain basic information as to the availability of storage tracks and switching facilities for the most expeditious handling and forwarding of salvaged materials. Notes were also made relative to the availability to the right-of-way of public and private roads for the contemplated hauling out of ties by trucks under contract.

The data collected on this inspection, together with that available from office records as to the current condition of the various structures and the locations of the various weights of rail, were subsequently presented at a meeting held in the general offices of the Burlington. At this meeting, every phase of the proposed dismantling work was considered, and a procedure was adopted which called for dividing the line into four sections on which the work could be carried out by four separate organizations simultaneously. The plan adopted also included the lineup of gangs and the equipment and work-train service to be used, and directed that all reclaimed materials be shipped to three points on the line, from which it could be moved to designated stores on the Burlington without foreign line haul.

On the basis of these plans, contract bids were invited and received, and subsequently compared with an estimated cost of dismantling the line with company forces. As the result of this comparison, it was decided to sell as many buildings in place as possible, to dispose of certain bridges in place to scrap dealers and to carry out all of the remaining dismantling work with company forces, with the single exception of the removal of crossties. As regards the crossties, it was decided to salvage all those with a remaining service life of four years or more, the work to be done under contract with trucks immediately following the removal af the rail, hauling the ties to the nearest available siding, from which they could be dispatched in cars to points of re-use on the Burlington. All ties not suitable for salvage and re-use were to be sold in place to interested parties.

Divided Into Four Sections

In accordance with the plan set up, the line was divided into four dismantling sections—Section No. 1 extending from North Kansas City to a point near Trimble, a distance of 26.26 miles; Section No. 2 joining Section No. 1 and extending eastward to Osborne, a distance of 21.90 miles; Section No. 3 extending from Osborne to Pattonsburg, a distance of 29.89 miles; and Section No. 4 extending from Pattonsburg, through Trenton, to Milan, a distance of 61.16 miles. The lengths of these different sections were determined in part by the extent of the bridge work involved and in part by convenience in the handling of released materials to points reached by Burlington trackage.

On Section No. 1, the work was begun at the east end and continued westward into North Kansas City, to which all released materials were shipped. In Sections 2 and 3, the work was started at their west end and east end, respectively, and continued progressively to Osborne, to which point all materials released on both sections were sent. On Section No. 4, the work was carried forward continuously from its west end toward Milan, where released materials were sent for transfer to the Burlington.

In addition to the track removal work, the more important work on Section No. 1, including the dismantling of four girder bridges, one truss span, 1,033 ft. of timber bridges and trestles, and the recovery of 30,045 crossties; on Section No. 2, there were no steel bridges, but there were 1,036 ft. of wood bridges and trestles to be removed and 39,838 ties to be recovered; on Section No. 3 there were five girder bridges and 3,975 ft. of wood bridges and trestles, and 42,790 ties to be salvaged; while on Section No. 4 there were nine girder bridges, two truss spans, 5,479 ft. of wood bridges and trestles, and 91,170 salvagable ties.

The track removal organizations on each of the sections, starting work simultaneously, were similar, consisting of a foreman, an assistant foreman, a timekeeper, an acetylene torch

operator and 30 trackmen, while the bridge forces employed were segregated into four different gangs, which worked alone on the different sections or together with other gangs as the extent or character of the bridge work required. Thus, for example, while one bridge gang, consisting of a foreman and six men, carried out all of the bridge removal work on Section No. 2, which included no steel bridges and only a relatively small amount of timber structures, in 15 days, two gangs, both of them larger than the gang employed on Section No. 2, worked a total of 148 gang-days in completing the heavy steel and timber bridge work on Section No. 4. Of these latter gangs, the largest employed essentially on steel removal work, included a foreman and an assistant foreman and 12 men.

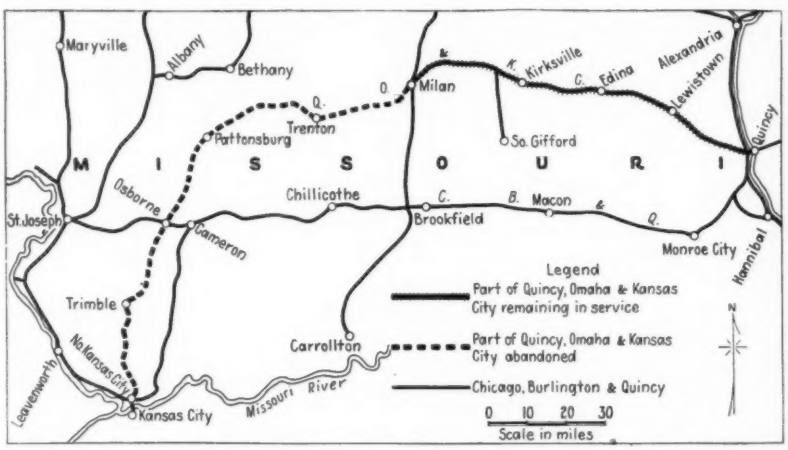
In addition to these track and bridge forces on the various sections, there was a telegraph department force on each section, consisting of a lineman and a groundman, assisted by laborers as necessary; and a general foreman in charge of all operations.

Rail Removal Procedure

The track removal work on the various sections was carried out essentially in three stages, taking both rails at one time—(1) preliminary stripping of the track; (2) removal of the rail and remaining fastenings; and (3) removal of the ties. The stripping work, which generally preceded from one-half mile to as much as two miles ahead of the rail-loading gang, was carried out by a force consisting of eight men and an assistant foreman, who pulled the spikes from most of the ties and stacked them and the released tie plates in small piles between the rails; one torchman and a helper, assisted by a watchman employed to prevent the starting of fires, who burned off three of the bolts at each joint and half through the fourth bolt, piling the scrap nuts and bolts; and three men with a tape, who measured the rail and marked the centers of each rail length for a balancing hold by the tongs of the rail-loading crane. In the spike stripping operations, only four ties to the rail length were left spiked on tangent track, while from six to eight were left spiked on curved track, depending upon the degree of curvature and the condition of the ties.

The rail-loading and scrap-gleaning organization usually included a total of 19 men and a crane operator, and in each case was equipped with a full-revolving American Eagle crane with a flat car coupled ahead of it. In this organization, immediately ahead of the crane in the direction of the work, one man with a maul removed the remaining bolt in each joint and knocked off the angle bars, and four men removed anti-creepers and loaded them, along with the angle bars and all spikes, bolts, nuts and tie plates previously removed, into a suitable bin provided at the advance end of the rail car.

Then followed the crane outfit, which was accompanied by four men pulling all remaining spikes; a crane operator; one rail-tong man on the ground; one man on the crane guiding the rails with a rope line as they were swung through 180-deg. for loading on the flat car; three men stacking the rails on the car in base to ball fashion; and one man segregating and piling the track fastenings. The final group in this force included four men (at least one with a pail) picking up the last of the spikes and the few remaining tie plates released with the removal of the rail, and carrying them ahead to the scrap-bin end of the rail car. With this force and method of procedure, the track dismantling work proceeded rapidly, and was delayed only at those bridges to be dismantled, beyond which it could not proceed until the bridge dismantling was completed.



Sketch Map of the Quincy, Omaha & Kansas City and Its Connections, Showing Part Abandoned and Part Remaining in Service

Dismantling the Bridges

In order to minimize the delay to the rail-loading forces at bridges, as much preliminary bridge dismantling work as possible was carried out ahead of the rail removal work, while assuring the safety of the bridges for work-train operation and movement of the rail crane. In the case of each of the three truss bridges dismantled, pile falsework bents were driven beneath the spans and were made to carry the entire deck load, so that the trusses could be dismantled in advance of the rail gang, leaving only the deck structures to be removed after the passage of the rail crane. Likewise, in the case of girder bridges, both inner and outer guard rails were removed, and as many as 50 per cent of the field connection rivets were cut out and replaced by bolts. Even in the case of the timber structures, the guard timbers were taken off and the nuts of many stringer and brace bolts were removed. On all of the bridges, the preliminary work also included the thinning out of the rail spikes and the removal of as many tie plates as possible.

For the final removal of both the steel and timber bridge structures, each of the bridge gangs had available one or two steam derricks, and, when desired, the rail-loading cranes also. When the rail crew reached a bridge, an empty flat car was substituted for any load of rail, and then a derrick, with a gondola car behind it, was brought up behind the rail crane and flat car. With this setup of equipment, the flexible, full-revolving rail crane was used to strip the bridge deck, handling all released materials, piece by piece or bundled together, around to position on the flat car, from whence the derrick picked them up and loaded them into the gondola car for road shipment. For the heavier loading operations, including the handling of girders and other heavy steel members, as well as timber stringers and piling, two steam derricks were employed, one of them replacing the rail crane, which was temporarily tied up at the nearest siding. Through this arrangement, employing two material-handling units, the speed of dismantling structures was increased materially. This was brought about largely by the fact that the work of the advance unit was not delayed by the necessity for

loading the materials into the gondola car to the best advantage for road shipment, this latter work being handled continuously and systematically by the second unit, without regard to the frequently more rapid handling of materials by the advance unit, and, at times, delays to the work of this unit in handling material while engaged in pulling structures apart or otherwise assisting the dismantling crew.

In all of the structure work, all steel was salvaged, as well as all serviceable deck timbers and sound piling in lengths of 10 ft. or more. While much of the steel dismantling required only the use of wrenches in view of the preliminary bolting which had been done, acetylene torches were used freely to cut out rivets and break connections, and power, chain-type saws were used in cutting off piles. No piling was pulled, both because of the added time that would have been required, and because of the questionable value of the timber below the ground line. However, all piling within channels or waterways was cut off close to the ground, whether salvaged or not, in order to remove its obstruction to the flow of water. No time was spent in loading out timber or piling which could not be salvaged to advantage, this being left along the right-of-way to be sold or otherwise disposed of to the best advantage.

While the bridge work at any point was under way, the rail-loading organization was used on miscellaneous work such as opening waterways at end of pipes, improving highway crossings affected by the retirement, assisting in the advance work, etc. Immediately upon the completion of the loading out of a bridge, the rail crane moved in with its force and proceeded with the track dismantling work, while the bridge crew proceeded with preliminary dismantling work on the bridges ahead.

Truck Out Good Crossties

As the rail and bridge removal work progressed, there remained behind only the track crossties. Of these, those with a remaining service life of four years or more were removed and trucked to railroad sidings under contract, at prices ranging from five to eight cents per tie. In this work, the trucks used were driven directly over the ties, reaching and leaving the roadbed at road crossings or through adjacent private property. The ties to be salvaged, which had been given a designating mark by a man following the rail-loading gang, were loaded progressively in the direction of the undisturbed roadbed, generally with a force of three men, thus always assuring a relatively smooth trucking surface for the trucks. At the railroad sidings, these ties were transferred by the contractor's forces into gondola cars for movement to points of re-use on various lines of the Burlington.

Sold Unserviceable Ties In Place

The ties remaining in the roadbed after the salvaged ties had been removed were disposed of readily to local purchasers who desired them for such purposes as firewood, fence posts, retaining walls, barn floors, etc. In some cases the ties were sold in units of a hundred, while in others they were sold by the mile; in either case at a price averaging about one cent per tie, and with the understanding that all of the ties would be removed out-of-face within 30 days from the date of purchase. All tie sales were handled by the general foreman on the section, employing a special bill of sale, who collected all moneys and made remittances directly to the treasurer of the railroad.

A Separate Steel Gang, Employing Steam Derricks, Moved Out the Heavy Steelwork

Other Salvage Work

As already stated, most of the buildings on the line, including depots, stock pens, miscellaneous roadway buildings and water tanks, were sold outright to local purchasers under agreements which required that they be removed promptly.

The remaining sizable item of material salvaged was that of reinforced concrete and cast iron culvert pipe, there being more than 225 culverts on the line involving these classes of pipe in diameters ranging from 12 in. to 72 in. While much of this pipe lay under high fills and could not be salvaged, and while it was necessary to leave much other pipe in place to continue established drainage arrangements, and thus preclude the possibility of subsequent damage claims, most of the end sections of pipe at the different culverts were salvaged, as well as a considerable amount of pipe in shallow fills. For the most part, this salvage work was carried out by the bridge forces, employing their derricks, equipped with a special hook on their fall lines, although a considerable amount of the smaller sizes of pipe in shallow fills were removed by the rail force.

Rapid Progress

Working in accordance with the plan and methods described, the work of dismantling the facilities in the 26.26 miles of Section No. 1 was completed in 37 days; that in the 21.90 miles of Section No. 2 in 31 days; that in the 29.89 miles of Section No. 3 in 48 days; and in the 61.16 miles of Section No. 4 in 98 days. The average number of miles of line dismantled per day on the different sections ranged from 0.62 to 0.71, with the maximum retirement obtained on any section in one day amounting to 1.71 miles, which was effected in a territory which involved no bridges or side tracks. Considering the project as a whole, 1.42 miles were removed per day.

While the program and general plans for the removal of the 139-mile section of the Q.O. & K.C. were formulated and carried out under the general direction of system officers of the Burlington, including F. T. Darrow, chief engineer; G. A. Haggander, assistant chief engineer; H. R. Clarke, engineer maintenance of way, and F. H. Cramer, bridge engineer, the actual field work was done under the direction of J. C. Grisinger, general superintendent of the Central district of the Burlington, at Burlington, Ia., and his district engineer maintenance of way, G. E. Yahn, who were represented in the field on Section No. 1 by H. W. Maxwell, terminal superintendent at Kansas City, Mo., and on the other three units by W. O. Frame, superintendent, with headquarters at Centerville, Ia.

The Exceedingly Wet Conditions Encountered in the 17-ft. Section Are Illustrated by This View Taken at the Crown. Part of the Exploration Channel Is Also Visible

A Novel Method the Erie to Stop Through the Arch of Brick Lining Is Described in

"Umbrella" Cures Severe

WHEN other methods proved ineffective in stopping the flow of water through a section of brick tunnel lining, the Erie solved the problem successfully in an unusual manner by devising and installing an "umbrella" over which water escaping through the arch lining flows down to drains placed in the bench walls. Essentially, this expedient, which was applied to a section of the lining 17 ft. long, involved the placing of what might be called an auxiliary arch lining, consisting of shotcrete placed against a form comprised of tongue-and-groove sheathing supported by curved channels bearing on the bench walls. To permit water percolating from the brick arch to flow freely over the "umbrella" to the bench-wall drains, it was so designed and installed as to allow an opening of ½-in. between the sheathing and the surface of the brick. As part of this work, the surface course of brick in the arch was removed, and, since the thickness of the auxiliary lining is approximately equivalent to that of this course, it does not encroach on the tunnel clearance.

The section of the tunnel to which the "umbrella" was applied comprised the mostly severely-affected part of a 75-ft. section of the lining through which water was percolating in considerable volume, and this project is also of interest because of the nature of the measures that were employed to waterproof and solidify the other 58 ft. of the section. These included the removal of the surface course of brick, the pressure grouting of the lining, the waterproofing of the surface and the application of a layer of shotcrete of such a thickness as to restore the arch to its original section. Also, vertical drain pipes of an improved design were installed in the bench walls to dispose of water that would otherwise collect behind the tunnel arch.

Water-Bearing Strata

The tunnel involved in this project is a double-track mile-long bore at Otisville, N. Y., on the Erie's Graham line, a low-grade freight line which forms part of this company's main route between New York and Chicago. This tunnel was constructed in 1906-8 and was driven for much of its length through solid rock. All except about 1,000 ft. of the tunnel is lined, the lining consisting of concrete bench walls and a circular arch comprised of five courses of brick laid in lime-cement mortar.

At a number of points, the lined portions of the tunnel extend through water-bearing strata, and during recent years considerable leakage of water through the arch lining has developed at several of these locations. The wet conditions were present in a particularly aggravated form throughout a 75-ft. section of the lining located about 1,000 ft. from the west portal, and it was to this portion of the lining to which the corrective measures were applied. Before the work was undertaken it was estimated that the percolation of water

This View of Repair Operations Shows of the Tunnel Before the Idea of

A Typical Section of the Completed Shotcrete Lining Installed, Which Stopped Dripping From the Arch, and Which Repeated Inspections Show to Be Standing Up Well

Developed by Water Flowing of a Section in a Tunnel This Article

Wet Condition In Erie Tunnel

through the tunnel lining in the 75-ft. section alone amounted to about 94 gal. per min.

It was decided to correct the situation in the 75-ft. section by consolidating and waterproofing the arch and by installing suitable drains in the bench walls in order to provide a means of escape for water percolating down onto the arch from above. Because of the exceedingly wet conditions, as evidenced by the constant discharge of water from the arch at numerous points, it was apparent that drastic measures would be required to restore the lining to a satisfactory degree of water-tightness. Following a consideration of various methods, the grouting and shotcreting process was chosen. It was originally planned to apply this process to the arch throughout the entire section but, as described in detail at another point in this article, it did not prove effective in the 17-ft. section and it was necessary to install the "umbrella" in that portion of the tunnel.

Work Under Way On the 17-ft. Section the Auxiliary Lining Was Conceived

The Repair Procedure

As the first step in the grouting and shotcreting process, the outer course of brick was removed from the arch with pneumatic chipping hammers. Next, in preparation for the grouting work, 1¼-in holes were drilled in the arch lining to varying depths (5 in. to 15 in.) to insure that grout would be deposited in all the joints between the different courses. The holes were located and spaced as required by conditions, but in general they were so arranged as to form a pattern consisting of 3-ft. squares. Also, holes of different depths were staggered with respect to each other.

For the greatest portion of the work a plain sand-cement grout was used. However, at certain locations it was necessary to use a grout having greater penetrating qualities, and for these locations a mix was used consisting of 2 parts of cement and ½ part of metallic waterproofing, the sand being eliminated altogether.

Because it was feared that higher pressures would have the effect of loosening the bricks, the pressure under which the grout was applied was limited to a maximum of 150 lb. per sq. in. The grout was injected through 1-in. nipples packed in place with lead wool. Following the grouting operation, the surface of the lining was sealed by the application of three coats of waterproofing. The first of these consisted of plain metallic waterproofing, with just enough cement paste added to act as a vehicle, the second was comprised of equal parts of metallic waterproofing and cement and the third of one part of waterproofing and two of cement.

At certain locations the grout was not entirely effective in stopping the

percolation of water through the lining and at these locations it was necessary to resort to a special procedure in applying the waterproofing. In such instances the usual practice was to concentrate the flow of water by drilling a hole in the lining at the approximate center of the affected area, after which the waterproofing was applied by starting the application around the edges of the area and working toward the center.

At locations within the area where the waterproofing failed to stop the flow of water, a quick-setting mix was applied to the surface of the lining with a trowel. Known as "hot-patches" because of the heat produced, these applications were made with a mix consisting of cement, a quick-setting compound and water. When the entire area, except the hole at the center, had been sealed, the hole was closed by filling it with the hot-patch mix. With this in view, the holes were made pear-shaped, with the small end at the surface of the lining.

When the surface of the lining had been waterproofed and sealed in the manner described above, 3-in. by 3-in. wire mesh reinforcing was applied, being fastened to the brick-work by lead-collar expansion bolts. To insure that they would not afford a means for the escape of water from the surface of the lining, the expansion bolts were applied prior to the application of the waterproofing. After the mesh had been placed, a 3-in. coating of 1:3 shotcrete was applied. In connection with this work the exploration manholes were closed by filling them with shotcrete.

Grouting Not Effective Here

The 17-ft. section of the lining in which the grouting process did not prove effective was located about 14 ft. from the easterly end of the 75-ft. section. In this area the flow of water through the arch lining was in such volume, amounting to approximately 66 gal. per min., as to wash out most of the grout before it had an opportunity to set. It was considered possible that the water causing this trouble came from a pocket behind the lining, the tapping of which would relieve the pressure sufficiently to permit the repair work to proceed. With this thought in mind a transverse channel about 24 in. wide was cut through the lining in the arch section entirely across the tunnel above the tops of the bench walls, the channel being located at an expansion joint in the arch lining.

The opening of the channel failed to relieve the pressure on adjacent portions of the arch to the desired degree, and it was apparent that measures other than the grouting and shotcreting of the lining would have to be applied to the 17-ft. section. However, before further steps could be taken it was necessary to close the transverse channel in the arch and in accomplishing this end advantage was taken of the opportunity that it afforded to install a suitable drain behind the lining on the location of the channel. This drain, which is constructed of sheets of 20-gage copper-bearing steel, consists of a V-shaped trough, 6-in. deep, which is so installed in the channel within the limits of the arch wall that the point of the V is directed toward the inner surface or intrados of the arch. The legs of the V have a total length of 18 in. and, for a width of 4 in. at their outer edges, the plates forming them extend behind the arch lining and are bent at such an angle as to permit them to lie flat against the brick surface.

Thus the drain forms a continuous trough around the outer surface or extrados of the arch between the tops of the bench walls, which acts as a medium for collecting and carrying away the water that accumulates in its immediate vicinity. Water discharged from this drain escapes to the side ditches through the new vertical drains in the bench walls, one of which is located approximately at each end of the transverse drain.

Coincident with the installation of the V-shaped drain, the remainder of the channel was filled with shotcrete. To serve as reinforcing for the shotcrete and as anchorages for the drain, ½-in. round reinforcing rods were installed transversely in the channel on 2-ft. centers at a depth of about 2 in. from the surface of the brick. These rods were inserted in holes drilled in the walls of the channel. Sixteen-gage wire was used to tie the drain to the reinforcing rods.

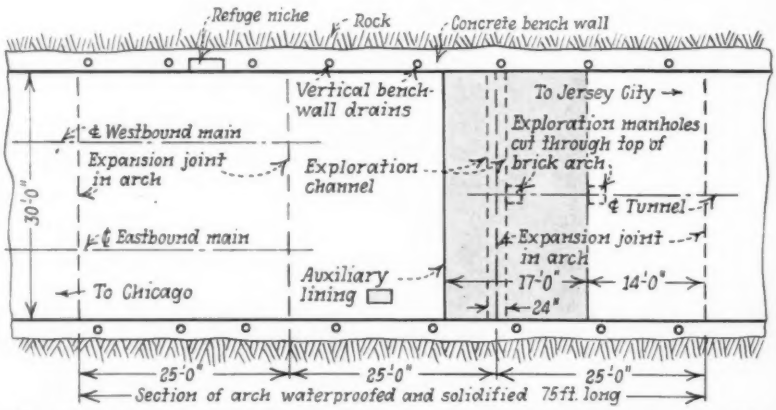
Observations that were made following the installation of the transverse drain disclosed that, of the total quantity of water that was being discharged through the tunnel lining in the 17-ft. section, an amount totaling about 30 gal. per min. was finding its way out through the drain. This meant that about 36 gal. per min. were still being discharged through the arch lining, but this was further reduced to about 24 gal. per min. by grouting and the application of hot-patches.

With the channel closed, it was possible to take further steps to correct the wet condition in the 17-ft. section. An effort was made to accomplish the desired results by placing shotcrete against the arch with the aid of forms but this expedient proved ineffective. It was at this point in the course of the work that the construction of an "umbrella," or auxiliary lining, was conceived.

Description of "Umbrella"

As stated at the outset, the auxiliary lining embodies curved channels supporting timber tongue-and-groove sheathing which provided the form for a coating of shotcrete. The channels used, which were precurved to a radius of 15 ft. 3 in., are of the 6-in. by 1⅞-in. by 8.2-lb. section. These were supplied in segments about 12 ft. long, and a sufficient number of them were provided to form four semi-circular arch-rib supports. The ends of each of these ribs are supported on bearing seats cut in the bench walls, and, to serve as a base plate, a ⅝-in. by 2-in. by 8-in. plate was welded to the end of each arch rib. Also, the ribs are anchored to the bench walls at each point of bearing by two ½-in. by 6-in. lead-collar expansion bolts.

The tongue-and-groove sheathing consists of the best grade of untreated



Plan of That Portion of the Tunnel Involved in the Repair Work, Showing Shaded, a Section of Auxiliary Lining

yellow pine that could be obtained and was furnished in 1-in. by 6-in. pieces. These pieces were laid up on the arch ribs with the long dimension parallel to the axis of the tunnel and were fastened in place by bolting each fourth piece to each arch rib. Since the timber sheathing was applied over the arch ribs for the entire distance between the tops of the bench walls, it forms, in effect, a canopy or "umbrella" that prevents water from above falling down into the tunnel.

Open Space Important

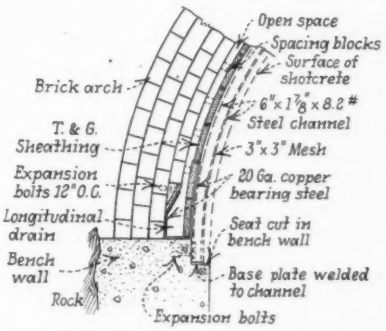
As mentioned previously, an open space of ½ in. was allowed between the sheathing and the surface of the arch. Since it constitutes the medium by means of which water percolating through the arch escapes to the bench-wall drains, this space comprises an important element in the "umbrella" scheme, and, to insure that it will be maintained at all times, small wood spacing blocks were wedged in between the arch and the sheathing at frequent intervals. Specifically, four of these spacer blocks were placed for each timber, namely, at each point where the piece crosses an arch rib.

When the arch ribs and the timber sheathing had been installed, sufficient shotcrete was applied to restore the arch to its original dimensions. To act as reinforcing for the gunite, 3-in. by 3-in. wire mesh was applied which was wired to the legs of the channels. It was desired to maintain this mesh at a spacing of 1 in. from the timber sheathing and for this purpose 2-in. wood screws were used which were placed on 12-in. centers each way. In its outward aspects, the appearance of the arch lining in the 17-ft. section is the same as that of the adjoining lining.

In constructing the canopy, it was built up progressively from both sides toward the crown. The channel segments forming the respective arch ribs were spliced by means of bolted plates, and, until the closure could be made at the crown of the arch, the ribs were supported by means of temporary anchor bolts set in the brick work, or by staging.

Since it was obviously impossible to insert a closure piece of the sheathing at the crown, the opening (about 6 in. wide) was closed by a strip of 20-gage copper-bearing steel, 17 ft. long, which was inserted behind or over the sheathing and toggle-bolted to it. To insure the water-tightness of the joint, the points of contact between the closure strip and the sheathing were caulked thoroughly with oakum and mastic.

To provide a means by which water draining from the sheathing can find its way to the vertical bench-wall drain at each end of the transverse drain, a longitudinal drain was installed behind the sheathing along the top of each bench wall for the length of the 17-ft. section. Each of these drains empties through a 4-in. copper

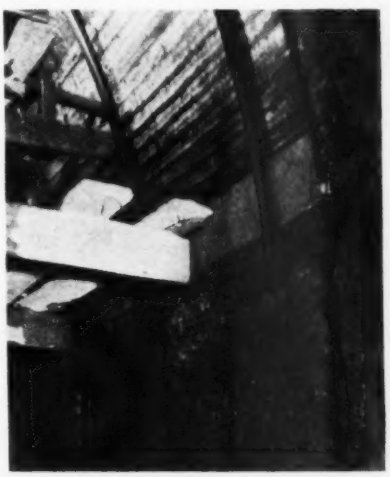


Section Through the Arch at Bench Wall, Showing Construction of Auxiliary Lining

leader into a basin in the top of the bench wall behind the upper end of the vertical drain.

To make space for the longitudinal drains, two rows of brick were removed from the second course in the arch directly at the top of each bench wall. In each case the fillet beneath the overhanging row of bricks was filled with shotcrete reinforced with a strip of 3-in. by 3-in. mesh which was held in place with expansion bolts placed on 12-in. centers.

The longitudinal openings that were provided behind the sheathing by the removal of the bricks were each lined with a sheet of 20-gage copper-bearing steel, 24-in. wide and 17-ft. long, which was formed to the required trough-like shape. The outside wall of the trough thus formed was placed between the channel ribs and the sheathing instead of behind the latter; hence it serves somewhat in the nature of flashing in sealing the joint formed at the juncture of the sheathing and the top of the bench wall.



Construction View Showing the Channels and Sheathing of the Auxiliary Lining

The vertical drains that were installed in the bench walls of the tunnel in the 75-ft. section as a part of this project embody a number of noteworthy features. The principal element of each of these drains is a 4-in. wrought-iron pipe that is embedded in the bench wall in a vertical position. At its lower end, each of these pipes is curved outward in order to attain a discharge opening through the face of the bench wall, this opening in each case being near the base of the wall.

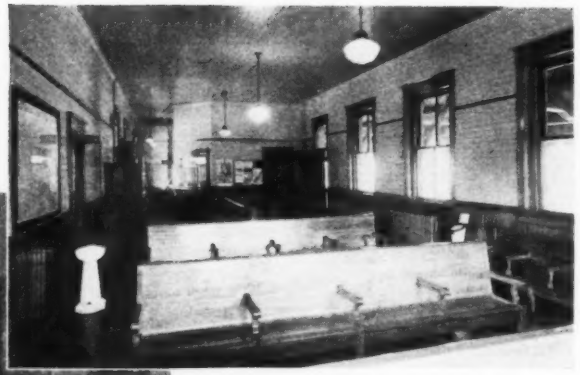
At its upper end each drain pipe is brazed to a horizontal 4-in. wrought-iron pipe, 24 in. long, which is placed in the bench wall at right angles to its face. One end of the horizontal pipe is flush with the face of the wall, while the other end opens onto a basin, about 10-in square, cut in the bench wall behind the arch lining. At the point where the two pipes are joined together, ½-in. round holes are cut in the horizontal unit to act as a screen.

All the repair work involved on this project was carried out under contract. For the work on the arch, a jumbo was employed, which involved the use of six push cars, three on each track. Each push car embodied a separate tower, and working platforms were provided by laying planks between the towers. Air for the shotcreting work was supplied by a 330-cu. ft. compressor which was located at the west portal, the air being piped to the location of the work. Air for the drilling and chipping operations was furnished by a 220-cu. ft. portable track-mounted compressor.

Repairs a Success

The repair work described in this article was completed in the middle of 1939 and frequent inspections of the repaired lining since that time have shown the surface of the shotcrete to be sound and dry. Since the winter of 1939-40 was especially severe, being accompanied by unusually low temperatures for extended periods, it is apparent that the repair work has withstood a rigorous test.

This project was carried out under the general direction of J. C. Patterson, chief engineer maintenance of way of the Erie, and I. H. Schram, engineer maintenance of way of the Eastern district. B. Blowers, division engineer of the New York division, exercised direct supervision over the project. The contractor on the work was the Pneumatic Construction Company, Providence, R. I.



Before and After. Right—The Crowded and Completely Obsolete Waiting Room of the North Western's Passenger Station at Rochester, Minn., as It Was. Below—The Same Room and Ticket Office After Modernization

Station At Famous Clinic Gets Overhauling

Confronted by a station interior that was not only obsolete but unprepossessing in appearance, the Chicago & North Western, through the use of modern materials, transformed its station at Rochester, Minn., into an attractive structure at less than the cost for replacement

PROBABLY no town of its size on the Chicago & North Western is more widely known than Rochester, Minn., for year after year thousands of persons go there for physical examination and overhauling at the Mayo Clinic, the largest of its kind in the world. The North Western has catered to this traffic by improving its passenger service from time to time, until recently it has been routing a section of its streamlined "400" through this city. For many years, however, these passengers have been handled through an outmoded passenger station that was built more than a half-century ago. While some improvements had been made to the building and facilities from time to time since they were placed in service, in an attempt to meet the growing demands of an increasingly discriminating traffic, the appointments remained hopelessly out-of-date.

Building Sound Structurally

It was decided, therefore, to modernize this station to improve its appearance and to bring its accommodations and appointments more in line with the character of the train service that is being provided, as well as in keeping with the importance of the city it serves. The exterior walls of the building are constructed of rough-faced stone from the foundation to the height of the window sills, and of red pressed brick above this elevation. From a physical viewpoint, the structure was in good condition and, architecturally, the exterior appearance was considered satisfactory, provided certain changes were made and certain work performed, as will be mentioned later.

Built in 1890, the interior of the station possessed all of the unimaginative dullness of the stations of that period. The interior walls, partitions and ceilings were finished with beaded ceiling lumber, running horizontally, without ornamentation or break in the monotony, except for a belt of wainscoting that was made of boards of greater width than the beaded ceiling. The doors and windows were obsolete in design. From time to time, subsequent to the completion of the station, improvements were added, including electric lights and sanitary toilets, both of which were hopelessly out of date by the time the plans for modernization were prepared; other improvements were made to platforms and driveways, and a steam heating plant that is still modern was installed.

Long and Narrow

In plan, the station is long and narrow and the ceiling is high, the interior dimensions being 128 ft. 4 in. by 19 ft. 10 in., with a ceiling height of 13 ft. 10 in. Because of the flat, unrelieved, wall surface, however, the ceiling appeared to be much higher. The ticket office, approximately 14 ft. by 24 ft., with a counter shelf 12 in. wide outside partition walls which extended to the ceiling, substantially divided the interior into two equal parts, connected only by a narrow passageway between the office space and the exterior wall.

About four years ago, the floor in the station was replaced with asphalt

tile in alternating squares of black and dark red, giving a checkerboard effect, which were laid over the existing wood floor. At the same time, a black rubber base board was installed. As this floor and baseboard were in good condition and could be fitted nicely into the color scheme that was selected, they were retained as a part of the new plan. The floors of the toilet rooms were of wood, however, and were torn out, the spaces beneath them were filled with sand and a concrete floor with concrete baseboard was constructed in each of the toilets of the station.

New Plan Pleasing

As the plan was developed, the alterations were made in such a way that the appearance of the interior of the station was brought into harmony with that of the streamlined trains that the road is now operating. Although the general appearance of the exterior of the building was satisfactory, it was designed in accordance with the architectural standards of a half-century ago, and did not lend itself easily to streamlining, except at a cost out of proportion with the benefits. For these reasons, it was decided to make no alterations to the exterior, but only to clean the wall surfaces. Accordingly, all stone work was cleaned with the sand blast, and the brick surfaces were washed with a solution of muriatic acid and rinsed with clear water.

In addition, changes that did affect the external appearance of the structure involved the replacement with modern designs of the windows and doors, which were completely out of date with respect to both appearance and operation. The frames, as well as the sash and the doors themselves, were torn out and in making the replacements, which included the interior doors also, designs were chosen to correspond with the appearance of the remainder of the interior. As installed, the upper halves of the exterior doors are each fitted with a single large pane of plate glass with aluminum push bars to protect them; the interior doors do not have glass panels. The lower sash of the windows, which reach above the eye level of persons standing on the station floor, are a single pane, while the upper sash are divided into six panes. Because of the severity of the winters in this section, all windows were fitted with weather strips.

While it was obviously necessary to replace the door and window frames, the wood trim around these openings was not restored. Instead, the material with which the walls were finished was brought up to the openings and utilized in place of the trim to finish them, thus eliminating the unpleasing contrast of the original trim and at the same time adding to the streamlined effect.

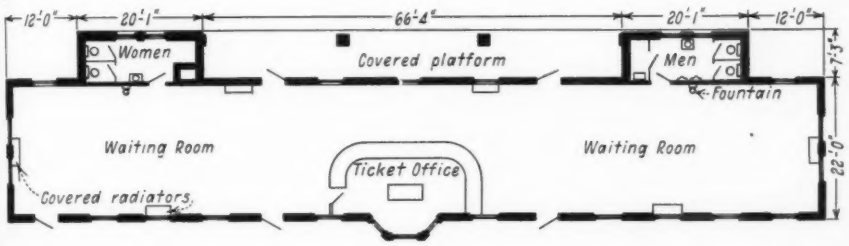
Apply New Wall Surfaces

Since the building was sound structurally and showed no evidence of decay, and since the existing beaded ceiling made an excellent foundation for the material selected for the wall finish, there was no advantage in tearing it out. Accordingly, the walls were first covered with asphalt-saturated roofing felt as a deadening course, on which Johns-Manville Flexboard was applied from the base board to the tops of the windows, and a thick wood-fibre board, known as Bevel Panel Board, also manufactured by Johns-Manville, was used for the ceiling and freize.

Delicate Colors Employed

Flexboard of a light green color was applied to the lower four feet of the walls, above which the material is light buff to the tops of the windows. Separating the two colors is a band of the same material, 4 in. wide, in black, to give the necessary contrast and break the monotony of the smooth plain surfaces. The fibre board used on the ceiling and freize is painted a delicate pink to harmonize with the color scheme, as well as to correspond with the tinting of the Flexboard on the side walls. The walls and ceiling of the two toilets were finished in the same manner as the waiting room.

All vertical and horizontal joints on both the flat surfaces and the corners of the side walls were hidden by specially-designed aluminum mould-



As Shown in This Plan, the Station Is Long and Narrow, Thus Lending Itself to Streamlining

In the Redecorated Station, the Lines Are Simple, the Colors Are Harmonious and the Effect Is One of Quiet Restfulness

ing strips. These strips were nailed to the beaded boards that had comprised the waiting room walls and the 4-ft. wide Flexboard sheets were slipped into grooves designed for this purpose, and are thus held in place behind the moulding strips without other form of fastening. A special wood moulding was applied at the elevation of the top of the windows, and was rebated on the under side to receive the Flexboard and along the upper edge to receive the frieze. The material used for the ceiling and frieze surfaces is ½ in. thick and was applied in panels 16 in. by 32 in. in area. Being a wood fibre board, it was nailed directly to the old wood surface, over a course of deadening felt.

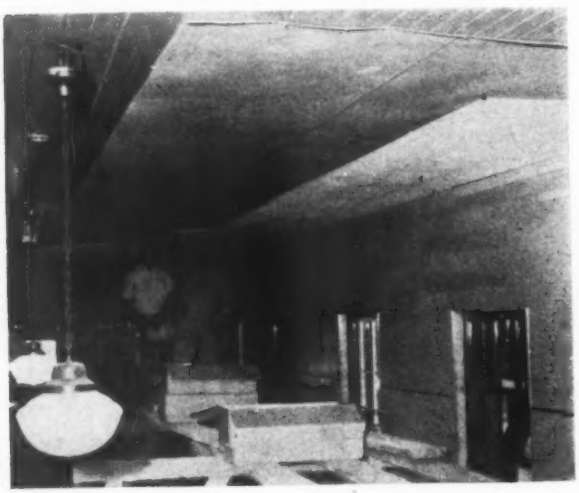
Plumbing Is Replaced

Owing to their complete obsolescence, the plumbing, sanitary fixtures and furnishings of the two toilet rooms were all torn out and replaced with modern equipment. The toilets are equipped with low-down tanks, the urinals are of the floor type and the lavatories are of porcelain of the latest design. A service sink was installed in the men's toilet room for the accommodation of the janitor, and a small enclosure was constructed for his brooms, mops and other supplies. The toilet partitions are of metal construction, replacing the high and unsanitary wooden partitions. A small table, a draw-up chair and a mirror were also placed in the women's toilet. The drinking fountains in the waiting room, which had been placed recently, were retained.

Ticket Counter a Feature

Probably, the most important feature of the modernization was in the ticket office. Instead of retaining the typical office enclosure, which in this case almost completely separated the two ends of the waiting room, and which was intended originally to create two independent waiting rooms, the partitions walls enclosing this facility were torn out and an open counter was substituted for the enclosure, thus throwing the entire space into one room. When the partitions enclosing the ticket office were removed, the floor of this area was laid with new asphalt tile, duplicating the pattern on the remainder of the waiting room floor.

This counter, which is adjacent to the wall on the track side of the building, is at the center of the waiting room, is 24 ft. long and extends 11 ft. into the room. It provides space for file drawers, folder racks and other drawers and compartments, and includes space for an iron safe and a telegrapher's table. Behind this counter, there is a back counter, 30 in. by 45 in. by 42 in. high, which contains space for all necessary ticket forms and cash drawers, these facilities being in duplicate to accommodate two ticket sellers. These counters, which are of metal, were furnished by the Art Metal Construction Company of Jamestown, N. Y.



Bevel Panel Board Was Applied to the Ceiling Over a Deadening Course of Asphalt-Saturated Roofing Felt

Harmonize With Room

The fronts of the counters are covered with light green Flexboard to match the adjacent walls, and are divided into 4-ft. panels, with aluminum moulding strips covering the vertical joints, as in the walls. In applying this material to the counters, wood studs on 24-in. centers were fastened to the metal with specially designed fastenings. Two ½-in. layers of plywood were then nailed to the studs and the Flexboard was applied over the plywood. A special wood moulding was fastened around the tops of both counters, with rebates to receive a rubber top approximately ⅛ in. thick, which is solid black in color and is glued to the metal tops. The exposed parts of the counters, which are not covered with the Flexboard or the rubber topping, are finished in baked enamel of a color approximating the green of the Flexboard. The furniture within the counter enclosure consists of an ordinary metal office desk, two swivel office chairs and a metal clothes press for the ticket force.

New Lighting Effective

As both the electric wiring and the lighting fixtures were obsolete, they were torn out and the building was rewired according to modern standards. New chromium-plated fixtures of the indirect-lighting type were installed, of a pleasing design that fits into the general scheme and heightens the streamlined effect. Wiring and outlets were also provided for an electric clock and a public-address system.

As mentioned, the heating plant was retained in its entirety, but the high cast-iron radiators in the waiting room introduced a discordant note. For this reason, they were provided with metal covers that hide them completely and match the new work. Other new facilities include a bank of steel baggage lockers and a telephone booth, which have rounded corners and are decorated to match the interior coloring and thus fit in with the streamlined effect of the waiting room.

Monotony Is Gone

It is of interest that, through the use of belts of different but harmonizing colors, with relatively wide contrasting bands between them, the monotony of the plain wall surfaces has disappeared and one gets the impression of quiet, pleasing ornamentation considerably in excess of what has actually been done along this line. Furthermore, by carrying the ceiling material and color down to form the frieze, in appearance, the ceiling has been lowered perceptibly, and the room does not give the high box-like impression it did formerly.

The plans for this project were prepared by L. C. Winkelhaus, architectural engineer, under the direction of B. R. Kulp, chief engineer. R. W. Richardson, division engineer, was in charge of the execution of the plans, except the electrical work, which was installed under the direction of J. A. Andreucetti, electrical engineer. G. Schwartz & Company, Rochester, Minn., had the general contract for the work.

Installs Pump-Motor 664 ft. Below Ground Surface

This article describes the installation of a submersible electric motor and turbine pump by the Burlington, at Gillette, Wyo., at a depth of 664 ft. in a well 850-ft. deep. This installation, which has been giving continuous 24-hour-a-day service since October, 1939, is believed to be the deepest of its kind on any railroad in the country

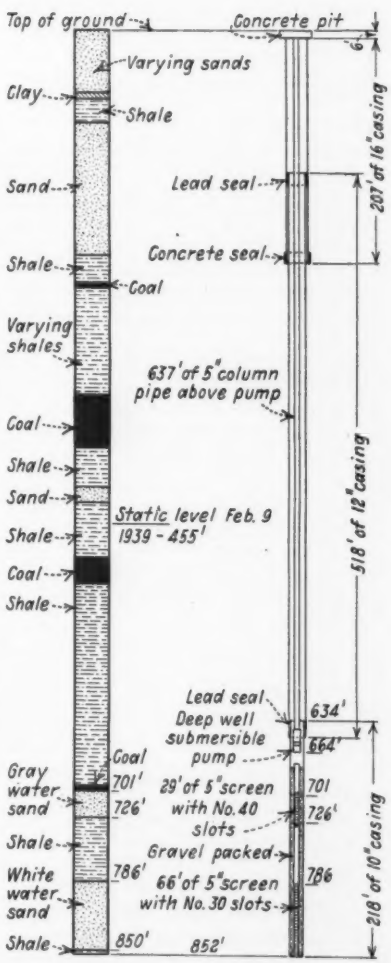
AT Gillette, Wyo., an important engine terminal on its Sheridan division, the Chicago, Burlington & Quincy has long been faced with a difficult water supply problem. In 1890 a well 865 ft. deep was dug and a deep well pump, consisting of an old working barrel and steam head, was installed and used for a number of years. This type of pumping was costly, and about 1907 a reservoir was constructed and the well was abandoned. The reservoir served except in extended drought periods.

The Burlington, in 1937, cleaned out the old well to see how deep it was necessary to go to secure a suitable supply of water and to check the quality of the water available from this source. It was found that a fair supply was present in two sand strata, one a gray sand located from 701 to 726 ft. below the ground level, and the other a white sand located from 786 to 850 ft. below the ground level. The water was soft but alkaline in character, with about 34 grains per gallon of dissolved solids, a large proportion of which was sodium carbonate. No treatment was required for this water except the addition of anti-foam compound on the locomotives. An old steam pump was placed in operation in the old well and additional water was secured from the city.

Advantages of Submersible Unit

At the same time, a new 850-ft. well was drilled, and a Byron Jackson submersible motor and turbine pump was installed at a depth of approximately 664 ft. Several reasons dictated the selection of this type of pumping equipment. In order to pump the water with reasonable economy, it was desirable to use a turbine type pump. A submersible motor and pump eliminate a long drive shaft. This is important in wells of great depth, because a long rotating drive shaft must be straight or the shaft-whip will pound out the bearings and shaft. The thrust imposed by the long shaft creates a bearing load that requires the best in design, and drive shaft elongation under varying load conditions makes the accurate axial adjustment of the impellers in the pump difficult. In addition, there is a considerable friction loss for a submerged rotating shaft of the length required.

With the submersible motor-pump unit, practically the only problem is the positive sealing of the motor from any moisture penetration. This is accomplished by sealing the motor in a chamber filled with an oil of high dielectric strength. The drive shaft extension to the pump at the upper end of the motor is sealed with mercury to prevent the escape of the oil or the entrance of water. Below the motor chamber, a balance chamber contains water which is in direct communication with the well through a small tube that extends from the bottom of the chamber up along the outside of the motor chamber. This allows the oil in the motor chamber to expand without building up pressure when the motor becomes warm. Electric power for the operation of the motor is supplied through a lead-



Above—A View of the Well Derrick and the 80,000-Gal. Tank at Gillette, Wyo. Below—A Log of the Well Showing the Location of the Water Bearing Sand Strata and a Drawing Showing the Relative Location of Pump, Casing Pipe and Screens

sheathed, steel-armored marine cable, extending from the surface, down through the well casing, to the motor terminal box.

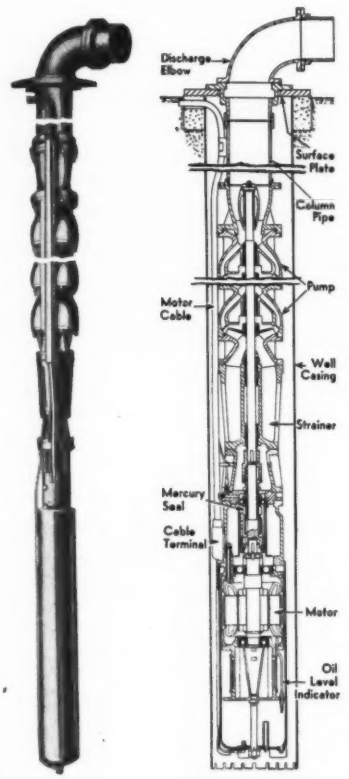
The submersible motors are very long and slender, since they must enter a drilled well only a few inches in diameter and yet allow enough clearance between the motor and well casing for sufficient intake for the turbine pump. The resultant motor, while considerably longer than corresponding surface motors, is said to be well suited for driving deep-well pumps. The small diameter rotor has a very low moment of inertia, giving it quick acceleration and a greater percentage of active copper in the windings, due to the reduced ratio of end turns to total copper, with consequent higher efficiency. The friction loss between the motor rotor and the oil in which the motor is sealed has been overcome by the introduction of petroleum ether in the oil, which vaporizes at a low temperature, and, when the motor becomes warm, the rotor is said to rotate in an oil vapor with consequent reduced friction.

First Installation

An 8-in., 14-stage, turbine pump directly connected to a 40-hp. sealed electric motor, operating at 3,600 r.p.m. on 440 volts of 3-phase, 60-cycle alternating current, was installed in the new well. The rated capacity was 150 gal. per min. against a 770-ft. head. The pump and motor were suspended by a 650-ft. column of 4-in. and 5-in. pipe, which served as the discharge column for the water. The 4-in. pipe was used at the lower end, above the pump, and the 5-in. pipe at the upper end for greater strength in supporting the load. The pump discharge line is connected directly to an 80,000-gal. tank which equalizes into another tank of 50,000 gal. capacity at the east end of the yard. A 5-in. elbow, check valve, blind flange and gate valve connect the discharge line to the water line to the tank.

The well is cased throughout its entire length, the lower portion with 218-ft. of 10-in. pipe in which 2-in. by 8-in. slots are cut at the water-bearing sand levels. The remainder of the well is cased with 518 ft. of 12-in. pipe and 207 ft. of 16-in. pipe. Lead seals are provided where the casing pipe overlapped and in addition a concrete seal is also placed at the upper connection between the 12 in. and 16-in. pipe. Since the operation of the pump is continuous, manual controls were installed, a switch box being located in the roundhouse foreman's office. A red light, which remains lit when the pump is in operation, is located over the well.

The discharge line and casing pipe are anchored to the concrete foundation of a well pit at the surface level. A clamp welded to the 5-in. discharge pipe at the top of the well is bolted with two one-inch eye bolts to a steel header plate 7/8 in. thick that is mounted in turn, on a steel ring 7/8 in. thick. This ring is 28 in. in outside diameter and 16 in. in inside diameter. It is welded to the top of the casing pipe and rests on a reinforced concrete footing in the floor of the well pit. The pit, which is 4 ft. by 9 ft. by 6 ft. deep, is protected by two planked decks, one at the ground level and the other about 1 ft. 9 in. below, to provide frost protection. Steel ladder rungs mounted in the concrete at one corner provide easy access. Above the pit a derrick or tower 33 ft. high, constructed of creosoted timber, was built for pulling the pump whenever necessary.



Photograph and Sectional Drawing of a Submersible Motor and Turbine Pump of the Type Installed at Gillette, Wyo.

Trouble With Sand

Shortly after the pump was installed, trouble was experienced because of the large amount of very fine sand suspended in the water. This sand, because of the high speed of the turbine pump, had a severe abrasive action and the pump was withdrawn twice for repairs. It was then decided to install special screens at the bottom of the well and gravel-pack the well on the outside of the screens to reduce the sand content of the water. It was also decided to install a new submersible motor and a larger pump that was designed to operate at a lower speed, to reduce the abrasive action of any sand which might still be suspended in the water.

Because the sand in the two strata from which the water was being pumped was of different degrees of fineness, screens with different size slots were used and two different sizes of gravel or filter sand were used in the gravel packing. A screen of red silicon brass, 66 ft. long and 5 in. in diameter with No. 30 slots was placed at the level of the lower sand stratum. Fifty-four feet of 4-in. pipe connected this screen to an upper screen of a similar type, 29 ft. long with No. 40 slots. Twenty-eight feet of 4-in. pipe was connected to the top of the upper screen, extending to within about 10 ft. of the motor-pump unit.

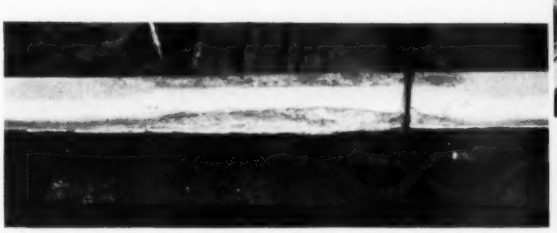
The screens were lowered into the well with a pipe for placing the gravel between the screen and casing pipe. Centering rings previously welded in place centered the screens in the lower 10-in. casing. The two sizes of a uniform washed gravel, known as filter sand, were placed, the finer size being placed around the lower screen and a larger size around the upper screen. The gravel was packed by using a swab and outside water pressure from the top while being placed. Twelve cubic yards were placed in this manner, a considerable portion of which passed through the slots in the casing pipe and filled the cavity made by the sand which had previously been pumped out.

New Motor-Pump Unit

After the new screens had been placed and gravel-packed, a new motor-pump unit was attached to the discharge column and lowered into the well to a depth of 664 ft. The motor of this unit was designed to operate at 1800 r.p.m., instead of 3600 r.p.m., and was connected to a 12-stage 10-in. turbine pump with a capacity of 150 gal. per min. In addition, the new motor-pump unit was operated at approximately half its rated capacity to reduce the possibility of damage from sand abrasion. Since the installation of the screens and the new submersible motor-pump in October, 1939, it has been operating continuously, pumping 80 gal. per. min., 24 hours per day with no trouble of any kind. Only one shut down of four hours has been reported, and that was due to a temporary power failure.

Strip Welding— What One Road Thinks About It*

In Strip Welding, as Illustrated Above, the Weld Metal, Applied in a Single Longitudinal Puddle, Is Confined to a Narrow Strip Centrally on the Running Surface of the Rail



A Strip Weld After More Than a Year's Service Under Heavy Traffic

By Col. A. L. BARTLETT

Engineer Maintenance of Way, New York, New Haven & Hartford, New Haven, Conn.

The New Haven is the first road to adopt "strip welding" as standard for building up battered rail ends. In this article, Col. Bartlett discusses the metallographic aspects of strip welding, and gives his views regarding its advantages. Also, he reviews its introduction and development on the New Haven, and describes the organization and procedure employed in its application.

SINCE 1938, the repair of battered rail ends on the New Haven has been performed exclusively by the "strip-welding" method, a procedure in which the application of weld metal is confined to a narrow strip, or causeway, placed centrally on the running surfaces of the rails. Our experience with welds of this type has not only been that their use results in substantial savings in labor and materials, but also that they have superior metallurgical qualities. In fact, a number of strip-welds have been in service in heavy-traffic territory on the New Haven since early in 1937 and are still in excellent condition.

For the purposes of this discussion it may be desirable to review briefly the causes and nature of rail-end batter and then to discuss in some detail the metallographic characteristics of strip welds that account for their durable qualities. Rail ends become battered and depressed below the general tread level chiefly because the rail steel, as ordinarily supplied from the mill, not being sufficiently hard, deforms plastically under repeated rolling loads. The surface of the rail spreads in the same manner as in the familiar "mushrooming" of a hammer or chisel head. This effect is greater and more rapid where and when the wheel bears on or near an edge of the rail tread, as at the end and side edges, because of the absence of adjacent metal on one side to help resist and support the wheel loads.

*Prepared from an address presented before the Metropolitan Maintenance of Way Club, New York.

Three Stages

The batter at rail joints takes place in three progressive stages, the preliminary steps being attributable to the fact that rail surfaces are crowned, which causes the large majority of the wheel loads to bear on a central, longitudinal riding strip. These progressive stages are as follows:

1. The surface metal at the extreme end edges of the rails at the joint first flows longitudinally towards the unsupported ends. This stage continues until the wheel loads begin to bear on the inside edges of the rails, owing to the flattening of the crowns.

2. Lateral or transverse flow takes place in the extreme end zones, usually first toward the inside and then toward the outside of the rail heads.

3. The lateral flow causes the battered zones to progress longitudinally in both directions from the extreme end edges of the rail at the joint.

The flow of metal, endwise and sidewise, causes the running surfaces of the rails in the vicinity of the joints to become depressed below the general tread level, resulting in what is commonly known as rail-end batter. By increasing the impact effect on the receiving rail ends at the joints, this depression increases the effect of the rolling loads to produce flow. On double track, where the traffic is unidirectional, the rate of flow (and extent of batter) is greater on the receiving rail ends because of the added effect of impact on those ends. The effect of impact continually increases as the depression increases, thus aggravating the tendency of the joint bars and spikes to become loosened and worn, which in turn disturbs and displaces the ballast in the vicinity of the joints. This in turn aggravates the loosening of the bars and increases the impact. Thus a vicious circle of cause and effect is maintained.

Early Repair Important

From the above considerations it is evident that the early conditioning and repair of battered rail joints is important, not only to break the vicious circle but because, when the battered zone is relatively short, the cost of repair is correspondingly low. It is also highly important that the repair process be capable of producing a reconditioned tread at the joints that is tough enough to withstand plastic flow and at the same time is free of cracks and brittle metal.

Hammering the Weld

Without attempting a full discussion of all the complex factors involved in the subject, it is interesting to take note of the protective hardening effect of plastic flow, known as cold work hardening. This effect begins to have considerable deterrent action on the rate and extent of batter soon after the rail has been put in service; that is, soon after the superficial layer of decarburized (carbon-free) metal has been worn off the crown of the new rail. But cold work hardening has a natural upper limit and is not sufficient completely to prevent plastic flow.

Metallographic Considerations

The rate and extent of plastic flow, or rail batter, depend on (1) the external forces, i.e., the wheel loads, and (2) the internal resistance to deformation of the rail, which in turn is dependent on its metallographic structure. The external forces have already been considered briefly. It is beyond the scope of this discussion to describe fully the chemical and physical changes that occur within the rail steel and weld metal during the heating and cooling of the repair operation. Suffice it to say that the resulting structures for a given chemical composition are determined by the heating and cooling cycle, or heat treatment, and that these structures have definite individual properties and have been given individual names, as follows: Pearlite, sorbite, troostite, and martensite—to name those that are encountered in practice.

These individual structures overlap and merge into mixtures, such as pearlite-sorbite, sorbite-troostite, etc. In general, the essential difference between these structures is in the amount, distribution and size of the particles of the carbides of iron and manganese in the matrix. For a given composition, these differences in the carbides are determined by the heating and cooling to which the metal is subjected, and they determine the resulting physical properties, including the hardness and the resistance to plastic flow, or batter. In brief, the structure of rail metal depends on its composition, that is, the carbon and manganese content, and upon the thermal history, or heat treatment.

Rail steel of normal composition is usually pearlitic. Its resistance to plastic deformation, which is not very great, is roughly measured by its Brinell or shore (scleroscope) hardness number. In terms of Brinell, the hardness of rail as rolled ordinarily ranges from 250 to 275.

Heat Treatment

The resistance of rail steel to plastic flow can be increased by suitable methods of heat treatment that change the structure to sorbite, or to sorbite-troostite (more resistant) or to troostite (still more resistant). Troostite, the Brinell hardness of which ranges from 350 to 425, is resistant to plastic flow under the most severe conditions of load and speed. It represents the hardest state to which steel can be brought without inducing brittleness. The hardest of all is martensite, which has a Brinell rating of more than 425. Martensite, however, is brittle and should be avoided where severe impact is encountered.

Until a few years ago the metallographic structure of the built-up or welded zone at rail ends usually consisted of pearlite and sorbite. In the case of very short welds, less than about 2½ to 3 in. long, troostite was often produced, because of the more rapid cooling that occurred during the welding process. In the case of extremely short welds, such as are made in repairing chipped rail ends, martensite was often produced as a result of the still more rapid cooling of the welds. (Cooling after welding, it will be understood, is brought about chiefly by the conduction of the heat into the body of the rail head, and, to a much lesser extent, by radiation.) The short welds that were composed of troostite were found to be completely resistant to plastic flow and satisfactory in every way. But it was formerly thought impossible to produce troostite throughout welds longer than about three inches without a separate heat treatment after the welding had been completed.

The cooling of the welded zone at a rail end through the critical temperature is brought about chiefly by the conduction of the heat into the rail head, the rate of this heat conduction from one point to another being dependent on the difference in temperature between the two points. The difference in temperature is determined largely by the amount of heat that is introduced into the rail during the welding operation which, in turn, is dependent on the size and proportions of the weld. When the characteristics of the weld are such that a considerable amount of heat is absorbed by the adjacent metal during the welding operation, it follows that the cooling of the weld is retarded, thereby reducing its hardness. Moreover, unless the weld can be applied in a single longitudinal puddle of molten metal, it is necessary during the course of the welding operation to reheat portions of the weld metal that have already cooled below the critical temperature, thereby producing a secondary tempering or drawing effect.

Strip Welding Is Said to Simplify the Surface-Grinding Procedure

Strip Welding

These considerations, together with the observed fact that short welds composed of troostite were so durable that the crowned surfaces were not flattened, resulting in the wheel loads being carried principally on centrally-located riding strips, led to the practice of confining rail-end welds to a central strip, or causeway, across the battered joint. By limiting the width of this strip to that which can be covered in a single progressively-applied puddle, and by controlling the rate of application, that is, the heat input, it

is possible and practical to produce troostite uniformly throughout the weld, irrespective of its length. Reheating is avoided.

This strip welding, as it is called, converts the welding operation into a controlled heat treatment. At the same time it simplifies the welding procedure. Of equal, if not greater, importance than the uniformity and

Cross-Slotting the Joint with a Cross Grinder at a Newly-Placed Strip Weld

durability of strip welds is their economy in welding time and materials. The economies obtained depend on the width of the strip, which usually ranges between ¾ in. and 1½ in., or between one-third and one-half the width of the ball of the rail.

Becomes Standard After Tests

The idea of strip welding for rail-end repair originated with H. S. George of the Rail Maintenance Corporation, and through the cooperation of the engineering department of the New Haven, 65 test joints were installed on 130-lb. rail late in the fall of 1936. These joints were located about five miles west of New Haven in a track used by practically all eastbound freight trains entering New Haven and by some passenger trains. In the spring of 1937, after carrying traffic of approximately 8,000,000 tons, these test joints were found to be in excellent condition and it was decided to make a more extended investigation through additional installations.

Consequently, for the purpose of securing data on cost and savings, the joints in two track miles of 130-lb. rail at Kingston, R. I., were repaired by strip welding, and later a similar section was installed at Mystic, Conn., the latter to determine the effect of eliminating the hammering of the welds. In all, a total of 75 miles of track were repaired by strip welding on the New Haven during 1937.

By the spring of 1938, we had become convinced of the value and economy of the new type of welding, with the result that strip welding has been a standard practice on the New Haven since that time. To date, a total of nearly 600 track miles of rail has been repaired by the method. The advantages of strip welding are as follows: (1) Its economy; (2) simplification of the grinding operation; (3) the fact that heat input is confined to the centers of the rails, eliminating damage to welded rail-head signal bonds; and (4) its ability to produce hard, tough welds without supplementary heat treatment. Our experience to date indicates that strip welding is standing up under traffic in a satisfactory manner comparable with other welding.

Technique and Gang Organization

All rail-end welding on the New Haven is performed by the oxy-acetylene process, and in making strip welds a welding technique is used, employing a moderate excess of acetylene, in which the weld metal is applied to the rail without melting the parent metal. But first, any chipped places in the rail ends are repaired, using a neutral flame and thoroughly fusing the rail to remove defective metal, after which the weld is started at one end of the battered zone and carried forward in one bead or pass to the other. To insure that the cooling of each weld will take place at a uniform rate throughout its length, the welding procedure is retarded slightly at the extreme ends of the weld. No special apparatus or welding rods are required in making strip welds.

It has been our experience that skilled welders can be fully instructed in making strip welds in a few minutes. In the beginning, some welders may find it necessary to draw guide lines on the running surface of the rails to designate the lateral limits of the welds, but sufficient skill is soon acquired to permit the welder to dispense with such lines.

One effect of strip welding, as pointed out above, is to simplify the surface-grinding operation and to reduce the amount of grinding skill required. This is largely attributable to the fact that it is not necessary to grind strip welds to a contour. Thus, the speed of grinding the welds is increased, along with that of the actual welding work, so that one grinder is employed for each four welders.

The experience on the New Haven has been that, as to organization, personnel and general procedure, strip-welding gangs are not materially different than those employed in making full-ball welds. Generally speaking, our strip-welding gangs contain eight welders each, with the remainder of the gang including one foreman, one assistant foreman, one timekeeper, five welder helpers, three grinder operators, five grinder helpers, three watchmen, one water boy and one maintenance helper who drives the gang to and from the site of the work in a highway truck.

Two of the grinder operators are in charge of each of two surface grinders while the other operates the cross grinder. Two grinder helpers work with each of the surface grinders, while the fifth assists in the operation of the cross grinder. Two of the watchmen are on duty at night. Using a straightedge, the timekeeper or one of the helpers indicates the limits of the welds to be placed at each joint, and also marks on the rail at the joint its number and the length

A Completed Strip Weld, After Surface Grinding and Slotting Operations

of the weld. Also, each welder indicates his number on the joints that he welds.

Present practice on the New Haven contemplates the building up of the rail ends out-of-face in any given territory when the wear at the majority of the joints reaches 0.03 in. to 0.04 in. Prior to the welding work, joint shims or built-up bars are applied, preferably a week or more in advance of the welding operation.

What Our Readers Think

Track Gage and Car Wheels

Punxsutawney, Pa.

To The Editor:

The revised Code of Rules governing interchange of traffic, adopted by the Association of American Railroads, effective January 1, 1941, should cause trackmen to watch carefully the gage of track on sharp curves where the outer rail may be worn to the point where the contour of the gage side approximates that of the passing flanges. Cast iron, one-wear wrought and one-wear steel wheels are out of gage if they measure less than 4 ft. 5 in. from back to back of flanges; that is, they are not condemned until the minimum of 4 ft. 5 in. is reached.

Rule 74, of the Code provides that flanges on cast iron wheels of less than 80,000-lb. capacity are not to be condemned until the flat vertical surface extends 1 in. or more from the tread, or the flange takes the 15/16 thin-flange gage.

Rule 78 provides that where a broken rim slopes inwardly, the tread must have a width of 3¾ in., but that where it slopes outwardly a width of 3½ in. is permitted. In the maintenance-of-way department, it is not considered good practice to regage the rail on a curve, except for causes other than side wear on the rail head, until the gage has reached 4 ft. 9½ in.; that is, until the gage of the track is 1 in. wide.

If the foregoing limits are all permitted, and if all of them exist simultaneously, there will be only ⅞ in. of the tread of the wheel with a broken rim bearing on the inner rail, provided the speed of the train is sufficient to keep the thin flange of the wheel bearing against the worn head of the outer rail of the curve, when the treads of both wheels are down and in contact with the running surface of the rails.

It should not be forgotten, however, that when a vertically worn flange bears against the side of a curve-worn rail on the outside of a sharp curve, the tread of the lead wheel of the rear truck of the car is apt to rise above the top of the rail as much as ¼ in., because of the sharp flange climbing onto the shelf or groove that is worn into the gage side of the rail about ¾ in. down from the top. The height that such a worn flange will run up on the side of the worn outer rail will depend on the wear of the opposing wheels. The outer flange will not climb high enough to run over the top of the rail; it will adjust itself in the groove on the side of the rail, owing to the greater circumference of the flange bearing, compared with the opposing tread bearing. This position of the wheels with respect to the rail reduces the bearing of a broken-rim tread below the ⅞ in. possible maximum bearing on the inside rail of the curve, where the treads of both wheels of a pair are down and in contact with the running surface of the rails.

We have found that the correction of this situation, to insure the avoidance of accidents from this source, is to watch carefully the troughing in the head of the inner rail on sharp curves and to transpose the inner and outer rails, or to drag the flange-worn outer rail of the curve onto the adjoining tangent and replace it with unworn rail from the tangent. It would appear from the foregoing that the prescribed limits for condemning car wheels with worn flanges or broken rims or both deserves further study.

G. S. Crites.
Division Engineer, Baltimore & Ohio.

Two Features in the March Issue

Chicago

To The Editor:

I have just had time to glance through the March issue of *Railway Engineering and Maintenance* which came to my desk this morning, and while the matter is still fresh in my mind I am writing to comment on two features which especially impressed me. Neither of them appears in the text of the magazine, although I have thought for a long time that they might be termed editorials definitely aimed at an objective.

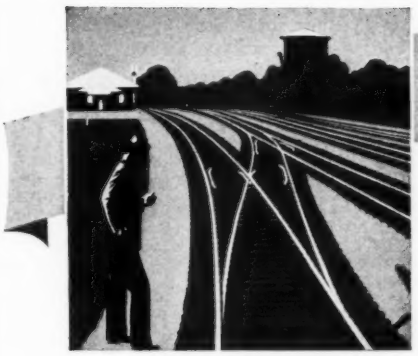
First was the article on page 148, addressed to railway supply manufacturers. The thing in this which struck me was the suggestion that it is not wise at any time to let down in sales effort. Just now this is a seller's market and the greatest problem is not to get orders but to secure delivery. As railway maintenance officers begin to start their spring programs, they are already finding that conditions are very different than they have been accustomed to during the last several years, and this situation will probably get worse for a time instead of better.

I agree with the idea expressed that it is well worth while for representatives of supply concerns to keep as closely in touch with their customers as they ever did and explain truthfully and as accurately as possible just what the situation is and make sure that the information they give in regard to possible deliveries is not the result of wishful thinking but involves promises that can be made good. It will help us a great deal in handling the work, in what may be rather difficult times, if we can know exactly what we can count on in the way of material deliveries. Knowing that, we can probably manage to make out some way.

Another reason why this particular discussion impressed me was that it followed so much along the line of my thinking for some years past with regard to the very noticeable decrease in sales effort and in maintaining contact which was so definitely evident on the part of some companies and so-called salesmen as compared with the policy of other companies—their competitors—that will probably not be forgotten as the railroads again come into the market.

The other feature that struck me was the editor's letter on page 164 on the subject of Advertisements. I always read this page with a great deal of interest as I think it is about the most clever page of advertising in the entire volume. So far as the advertising pages themselves are concerned, while I think that I never fail to look them over rather carefully, I am not able at the moment to recall any great number of occasions when they brought any new information to me. That probably is to be expected in the case of a maintenance officer located in Chicago. He cannot well help having all this information brought to his attention not once but many times by personal calls of sales representatives. I always find it interesting, however, to compare the advertising pages with the stories told by the representatives. Generally the same story is told and told much more concisely and definitely, probably for the reason that a page in *Railway Engineering and Maintenance* is fairly expensive and it pays to be brief, whereas in a personal visit the principal thing that is sometimes wasted is the time of the officer upon whom the call is being made, and apparently many of the sales representatives do not have time to be brief.

Maintenance Officer.



WHAT'S the Answer?

Who for Crossing Watchmen?

Should men who are nearing the retirement age or younger men be employed as crossing watchmen? Why?

Late Middle Age Preferred

By E. L. Henry
Superintendent of Safety, Chicago & North Western, Chicago

This is a question that is likely always to be open for discussion, and the conclusion in each instance will depend largely on the personal opinions, tempered by individual experience, of those who take part in the debate. I believe that this question should be approached in the light of long-range rather than short-range results and effectiveness. It must be recognized that the pay for such work is relatively low and that the prospects for advancement are quite limited; in fact, they are generally non-existant.

In view of this, the best men, ordinarily, for these jobs are those who for some reason have no great desire for advancement, but would rather have jobs that will assure them relative security and steady employment, even though the wages are low. Such persons generally feel that they need the job as much or more than the job needs them. As a consequence, they have a greater interest in exerting every effort of which they are capable to insure for themselves the security of their employment. With this attitude, they are more willing to conform to rules, regulations and other requirements of the job.

All in all, it appears that for these reasons men from late middle age and approaching the age of retirement are the most suitable for crossing watchmen. Such men also generally possess the further important requisite of being less subject to outside and distracting influences. They should, however, be subject to examination to determine their physical and mental fitness for this work. Physical or mental misfits or those who are not alert, should not be employed.

In this connection, young married men and married men of early middle age are also generally satisfactory as crossing flagmen, inasmuch as the responsibilities incident to their married status make them less prone to being affected by the distracting influences which, to a greater or less degree, affect single men of the same age groups. While many of the married men of the younger group may be expected eventually to seek employment in more lucrative fields, where greater opportunities exist for advancement, this tendency is markedly less than it is among those without family responsibilities.

Younger Men Better

By L. J. Benson
Assistant to Chief Operating Officer, Chicago, Milwaukee, St. Paul & Pacific, Chicago

I believe that younger men should be employed as crossing watchmen rather than men who are nearing the pension age. Since the installation and operation at many points of a type of electric crossing signal that is manually controlled, by which multiple crossings in double-track territory can be protected, younger men with fairly good education have been secured. They have proved beyond a reasonable doubt to be more alert, have made more intelligent witnesses in the event of lawsuits and make comprehensive reports of occurrences which happen under their jurisdiction.

I do not wish to discriminate against

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in June

1. *What conditions justify high lifts when surfacing track? What limitation, if any, should be made? Why?*

2. *What are the relative merits of screwed and welded connections for pipe railings?*

3. *When renewing joint bars or removing them for other reasons, should the rail ends be inspected for incipient bolt-hole breaks? Why? Does the weight of the rail or the design of the joint bars make any difference?*

4. *What advantages are there in placing struts in culvert pipe when it is being installed? What disadvantages? How should they be placed? How long should they be allowed to remain?*

5. *What is the best means of insuring adherence to adopted standards when laying rail? How should this be done? Why?*

6. *What are the relative advantages of flanged and bell and spigot cast-iron pipe? The disadvantages? For what purposes are each best adapted?*

7. *How far should one go in cleaning the roadbed and right-of-way before starting the working season? What are the advantages and disadvantages?*

8. *Should records be kept of the repairs to individual buildings? In what detail? Who should keep them? For what purpose can they be used?*

the veteran employee, particularly if he has had previous railway experience and is not too old to be alert. With this type of experience they have made satisfactory flagmen. Our experience with older men who are nearing the pension or retirement age is that they assume an entirely different attitude from that of the younger men and are reluctant to obey instructions; in some instances it has been necessary to remove them from the service for this reason. This is why we prefer the younger men who realize that their bread and butter depend entirely on their performance.

Must Know the Work

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

By the time a man is approaching the age of retirement he has usually given many years of service to the road upon which he is employed. Normally, by this time his qualifications are well known, and if he is alert mentally and physically and is disposed to obey instructions, I see no reason for displacing him by a younger man. The latter can do more tiring work or can work longer than the older man so that he has more opportunities open to him. If the man is not physically sound, if his reactions are slow or if he is a social misfit he should not be employed at a crossing where split-second decisions must be made, and all relations with the public should be on the friendliest basis.

Must Be Alert

By G. S. Crites
Division Engineer, Baltimore & Ohio, Punxsutawney, Pa.

On most roads the general rule of seniority and promotion does not apply to the positions of crossing watchmen, and thus makes these positions subject to influence of pressure groups. When work is slack, there is pressure to get these jobs; when it is plentiful, the pressure is directed to getting them off. During the horse-and-buggy days, anyone who was able to get to a crossing was considered to be competent to watch it. Fast-moving automotive vehicles, often in swarms on the highways, have changed all this and now a crossing watchman must be alert and a cool-headed diplomat to qualify as a suitable watchman.

Neither all men approaching retirement nor all younger men may have the requisite qualifications. Sometimes a man nearing 70 qualifies to perfection, while a younger man breeds trouble. A crossing watchman's primary duty is to protect life and limb. His qualifications must be studied carefully and the best man should be chosen for the job, regardless of pressure groups, retirement age or other considerations. The importance and responsibility of the position should not be overlooked when making the selection.

Can They Be Programmed?

Can bridge and building work be programmed? If not, why? What are the advantages and disadvantages?

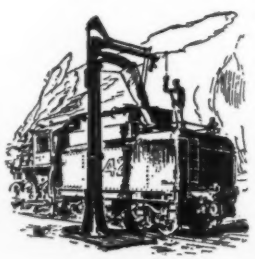
Reduces Stores Stocks

By H. G. Carter
Division Engineer, Central of Georgia, Columbus, Ga.

Bridge and building work can be and should be programmed carefully. To enable a program to be worked out, an annual inspection should be made of all bridges by a competent inspector or bridge supervisor, and a permanent record should be made, showing the life to be expected of each piece of timber, that is, whether it is good for 30 or 60 days, 6 months, 1 year or for a longer time, and all short-life timber should be marked for identification.

From these inspection reports, timber requisitions are made, in the order of importance, and the bridge program for the year is thus set up. In addition to the annual inspection, a monthly inspection is made by the bridge foreman, particular attention being given to short-life timber. Through the careful programming of our bridge work, we are maintaining 3,100 lin. ft. of trestles with two six-men bridge gangs, handling approximately 240,000 ft. b. m. of timber a year. In addition, these gangs replace and repair a comparable number of culverts.

I have mentioned bridges only, but a building program is equally important. Programming bridge and building work is the only means whereby one can be assured of having the necessary timber and lumber for repairs and at the same time can keep stocks to the minimum. Furthermore, the labor that is wasted in unnecessary moves is eliminated, and not the least of the benefits is that the material for each structure will be on hand by the time the gang is scheduled to make the repairs and arrives on the job.



Leads to Efficiency

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluffs, Mo.

I have found many advantages and no disadvantages in advance programming of bridge and building activities. It insures better inspections and closer estimating. It enables the supervisor to make a better comparison of the worth of his various forces, for it sets a goal for them to strive for, thus increasing both the quality and the quantity of work they do. This has been our practice for many years. We list each structure separately, together with an estimate of the material and labor required to complete the work on each item. When this has been done, a list of the proposed replacements is sent to the division engineer, who then, if it is a bridge, has a survey made to determine the drainage area and the size of opening, as well as the class of structure to be installed. All of this is done in advance of the final and more formal inspection that is made by the division, district and bridge engineers.

When this final inspection has been completed, a list of the material, including paint, and sizes that will be needed, is sent to the purchasing and stores departments. This enables them to provide the needed material and make deliveries in an orderly manner, without resort to unsatisfactory rush methods. We are not always able to complete all items that we schedule, for reasons beyond our control, principally the availability of the necessary funds, but what we are able to do is done in an orderly way without loss of time or waste of labor cross-hauling outfits. We also find that under a system of programming we are able to use our costly power ma-

chines to best advantage. Taken altogether, we find that programming leads to efficiency and economy.

Can Be Done

By F. H. Cramer
Bridge Engineer, Chicago, Burlington & Quincy, Chicago

Bridge and building work can be programmed, provided one knows in advance what work is to be done. With this knowledge, a schedule can be so prepared that the work can be carried out in a systematic manner, but it is quite important that a careful study be made of the conditions and requirements surrounding the work. To do this one should make careful notes during the year, covering such work as should be done during the following year. It should then be decided during the annual inspection what work is of the most importance, and the order in which it should be placed on the program. The work should then be listed in geographical order and bills of material should be prepared. From this list, the man-hours required to do the work can be calculated, together with the total estimated cost.

This program should be prepared early in the fall, so that there will be ample time for review and approval by the management. Care should be taken to insure that the schedule calls for an even distribution of the work over the entire year, and that it can be done with minimum interference with the use of the available work equipment, that is, one of the advantages of programming is that under a schedule, work equipment can be used to best advantage, and the schedule should be prepared on this basis. It also gives ample time for the delivery of materials, and for the foreman to plan and study the work.

Is Thoroughly Practical

By E. C. Neville
Bridge and Building Master, Canadian National, Toronto, Ont.

It is only in recent years that the pressure for more rigid control over all operations to insure maximum economy has impelled most roads to adopt the programming system, which has proved beyond any doubt to be both practical and economical. In preparing a program, the supervisor should make careful notes during his inspection trips, covering all work that he considers necessary to be done the following year, and in the fall he should compile his program, showing each job in the order of its importance, indicating the cost of the labor and material required. After this has been approved, he can make out his monthly budgets together with the requisitions for the material that will be needed, and request any extra equipment that will be required.

Care must be taken to distribute the work throughout the year, so that it can be done at the season best suited for the particular work and with the least interference with traffic. A main advantage of the program is that arrangements can be made in ample time for the materials that will be needed, and that deliveries can be assured when these materials are wanted.

Care of Switch Lamps

In view of the longer sections and smaller section gangs today, is it practical to assign the care of main-line switch lamps to one man? If not, why? If so, what are the advantages and disadvantages?

Conditions Vary Widely

By T. M. Pittman
Division Engineer, Illinois Central, Water Valley, Miss.

Conditions in different operating districts are so varied that it is difficult to adopt a general practice that can be applied to all with equally satisfactory results. Generally speaking, however, it is not economical to assign one man to care for the switch lamps, because he consumes too much time in riding. It will also be necessary to provide some means of transportation, probably a light motor car. This might constitute something of a hazard, particularly as he will have to handle the car alone. Switch lamps should not require attention oftener than twice a week, and they can be given this attention by the foreman while he is making his regular track inspection.

Experience has shown that the most satisfactory solution of the switch lamp problem is to do away with the oil-burning feature and replace the lenses in the lamps with reflector lenses. These require very little attention, only occasional cleaning of the surface, and are more effective than oil lamps. Their use is satisfactory, except in yards where there are frequent back-up movements, or where the light from the headlight of the locomotive is cut off by cars.

Favors One Man

By Ira W. Toy
Section Foreman, Minneapolis, St. Paul & Sault Ste. Marie, Marshfield, Wis.

I find a distinct advantage in having the care of switch lamps assigned to one man. He soon learns the characteristics of each lamp, for they have individual peculiarities. He knows exactly how high he can turn it so it will not smoke or be too low, thus giving a dim indication. Then, if we find poor indications caused by carelessness or negligence, we know who is responsible and can make the necessary correction. Again, if only one man is responsible, he soon recognizes his responsibility and is more likely to do his work carefully and well.

Patrolmen Can Do It

By Robert W. Strange
Roadmaster's Clerk, New York, Chicago & St. Louis, Charleston, Ill.

Where the track-patrol system is employed, it is practical to assign the care of switch lamps to the patrolmen. Our road has this system in effect on divisions where the track sections have been lengthened to approximately 10 miles. On one of these divisions three patrolmen are employed, each with territories approximately 50 miles long. During the last year the three patrolmen consumed approximately one-fourth the number of hours caring for main-line switch lamps as was consumed on the shortest division, where the lamps were cared for by the section forces. This represented a considerable loss in productive man-hours from the standpoint of actual maintenance on the short division.

It can be seen that there is a distinct advantage in assigning the care of main-line switch lamps to one man, where the conditions permit this to be done. The main benefit is that it releases the section gangs of this responsibility, and by doing so increases the range of their effectiveness in maintenance.

Where patrolmen are not employed, the section foreman must patrol his track and, since it is obviously impracticable for him to do this on foot, he must use his motor car, taking enough

men with him to handle the car. On these daily trips the lamps should be inspected, the burners adjusted, the lamps relighted and the lenses cleaned. On one day of the week, all lamps should be filled and cleaned. No charge should be made for the daily inspection, but the time actually consumed in filling and cleaning the lamps should be charged.

Depends on Track Patrol

By F. H. McKENNEY
District Engineer Maintenance, Chicago, Burlington & Quincy, Omaha, Neb.

As I view this question, the answer will depend in large measure on the system of track patrol in effect over these long sections. If the track is patrolled by the foreman and one or more men on a motor car, the care of the switch lamps should be in the hands of these men while they are on patrol. On some roads, where a track supervisor is assigned to patrol several sections daily, it is economical to assign this work to him, to enable the foreman and his gang to devote all of their time to constructive work, as directed by the supervisor.

In terminals or on outside territory where there are many switch lamps to maintain within a comparatively short distance, a lampman should be assigned. On long sections in open country, where switches may be several miles apart, their care should be tied in with the track patrol if conditions will permit.

What Is Excess Treatment?

What is meant by the term excess treatment as applied to water softening? Under what conditions is it desirable? What factors govern the amount of this excess?

It Is Necessary

By R. C. BARDWELL
Superintendent Water Supply, Chesapeake & Ohio, Richmond, Va.

The term excess treatment, as applied to water softening, means the excess chemicals used above the amounts required theoretically to complete the chemical reactions necessary for the neutralization of the objectionable constituents present in the water. Excess treatment is necessary in the proper operation of lime-soda ash plants, to force the reactions to completion and put the precipitated sludge in such condition that it will settle and can be removed. Chemical reactions in this class are somewhat reversible, that is, they can go either way to some extent. For this reason, unless advantage is taken of the law of mass reaction and unless additional chemicals are introduced to force the reaction to completion, reversible reactions will continue, which will result in a higher hardness remaining than is desired. There will also be the possibility of an objectionable milky water in the effluent as a result of incomplete reaction.

The same reasoning applies to the wayside method of treatment, when sufficient chemicals are added to neutralize the sulphate or non-carbonate hardness, which is the common binder material in the formation of hard boiler scale. This reaction is also reversible, if the chemicals are added in only the actual theoretical amounts needed, so that it is necessary to add at least a slight excess to eliminate the possibility of allowing calcium or magnesium sulphate to be present, as such, in boiler water.

The amount of the excess that is necessary or desirable, is a factor that is controlled by local conditions. The actual softening of the water is only one phase of water conditioning. As locomotives cannot be equipped with de-aerating feedwater heaters, there is always some oxygen going into the boilers with the water, which will cause pitting and corrosion unless it is counteracted by suitable treatment. The possibilities of pitting and corrosion are increased by the presence of larger amounts of dissolved neutral salts, such as sodium sulphate and sodium chloride.

Investigations by the Water Service committee of the A.R.E.A., particularly the report of the subcommittee under Dr. M. E. McDonnell in 1925, published on page 377, Vol. 26, of the Proceedings of the Association, as well as practical experience in the field over many years, have indicated that, to reduce the possibility of trouble from pitting and corrosion, as well as scale and leaking, it is necessary to maintain a sodium alkalinity in the water in locomotive boilers, amounting to at least 15 per cent of the total dissolved solids. In actual practice, it is customary to endeavor to hold this sodium alkalinity to the minimum of 20 per cent to be on the safe side, and to the maximum of 30 per cent to avoid wasting chemicals.

In some instances individual conditions may permit some variation from these figures, which are recognized as good, safe practice. In general, however, they will control the amount of excess treatment desirable, as it is usually necessary to add excess treatment to maintain this sodium alkalinity ratio for good boiler and economical operating conditions.

Alkalinity Desirable

By C. R. KNOWLES
Superintendent Water Service, Illinois Central, Chicago

The term excess treatment, as applied to water softening, is used to express the amount of carbonate alkalinity in excess of the hardness. Since this condition occurs frequently in natural waters, the term excess is not always correct, and it probably would be more desirable to use the term reserve treatment where water is treated and perhaps reserve carbonate alkalinity when it occurs in natural waters. The difference between methyl orange alkalinity and hardness represents the amount of sodium alkalinity and is a measure of the degree to which the water has been softened.

It is always desirable to have a certain amount of sodium alkalinity in a boiler water to insure the removal of the permanent hardness. The amount required depends on the amount of permanent hardness to be removed as well as on the amount of total dissolved solids in the water. If sufficient alkalinity is not present, the permanent (sulphate) hardness will not be converted completely to the carbonate form, with the result that, combined with a portion of the precipitated carbonates, it will form scale.

There is no fixed rule as to the amount of excess or reserve that should be carried, as this will depend on the hardness and other characteristics of the water. Proper treatment requires that sufficient chemicals be introduced into the boiler feedwater to maintain a more or less definite ratio between the caustic alkalinity of the boiler water and the total dissolved solids. This ratio has been fixed at from 10 to 15 per cent, depending on the character and amount of dissolved solids.

To obtain this result, the required excess alkalinity must be maintained in the treated water before it is introduced into the boiler. In other words, sufficient treatment must be present to produce a caustic alkalinity equal to 10 to 15 per cent, or even more, of the total dissolved solids

present in the boiler water. A typical analysis of a properly treated boiler water, taken from the boiler, would be as follows: Total dissolved solids, 100 grains per gal.; hardness (soap), 0.1; alkalinity (methyl orange), 30; causticity (double the phenolphthalein alkalinity), 45. This example of the caustic alkalanity ratio to total dissolved solids is given merely as an example and may not apply literally to all waters in actual practice.

Preparing Tinted Paints

How does one prepare tinted paints? What precautions are desirable? How can tints that have already been applied be matched?

Must Use Care

By E. C. Neville
Bridge and Building Master, Canadian National, Toronto, Ont.

Tinted paints can be prepared by adding tinting colors to a good quality of white lead. These colors can usually be secured from any paint dealer, in either a 1-lb. or a 5-lb. can. One should be careful to select a brand that is known to be reliable, that will not fade or go on in streaks. As a rule, these colors are quite strong and must be mixed with considerable care, since it requires only a small amount to tint a gallon of white lead mixed in oil. The color should be added in small amounts—the rate should be reduced to drops as the required tint is nearly obtained—and mixed thoroughly before more is added. It should require only a few ounces to tint a gallon of white paint, and it is not desirable to reduce too deep a color by adding white paint.

Charts are generally available from dealers, which show the approximate amount of coloring required per gallon. Certain warm tints can be obtained by mixing two or more colors, but as this is more complex, it demands more skill and more care than the addition of a single tinting color. To match tints that have already been applied, the same method should be followed, adding small amounts of coloring until a match is obtained.

No Hard and Fast Rules

By General Inspector of Buildings

Most experienced painters have developed their own technic for preparing tinted paints and, while these practices are fundamentally alike, they differ somewhat widely in execution. For this reason there need be no hard-and-fast rules for the preparation of tinted paints, except that the operation should be based on the use of white lead. Tinting colors come in paste form, ground in oil. There are two principal methods for introducing them into the paint, that is, they can be introduced into the white lead while it is in the paste form, before the vehicle is added, or they can be added after the lead paste has been thinned in the oil.

Since the color paste is of substantially the same consistency as the white-lead paste there is no difficulty on this score and the advocates of the first method contend that a more thorough dispersion of the color can be obtained before the vehicle is added. On the other hand, it seems to be well established that, if the colors are gound to the necessary degree of fineness to give the best results after application, complete dispersion, with no evidence of streaking can be obtained when mixed with the lead after the vehicle has been added. Advocates of this method contend that where two batches of paints must be matched this can be done more exactly by this method, for they claim that if the vehicle is added after the color is mixed in, this will change the shade.

Extreme care should be exercised to insure against adding too much color. It is not difficult to bring the color up to the desired shade by adding color; it is far less simple to reduce to the correct shade if too much color has been used. For this reason, the color should be added a little at a time, and mixed thoroughly before more is added, using care to erase all streaks.

To match tints already applied, one needs a reasonably large panel for purposes of comparison, since slight variations are not easily detected from small areas. Since wet paint has a considerably different appearance from that after it has dried, the panel should be painted and dried before the comparison is made. Probably the most important factor in the matching of tints is to use a reliable brand of tinting colors ground and packaged in oil. These colors can be depended on not to vary from year to year or season to season, and the only variable will be the ability to detect color variations which result from variations in preparing the mixture.

Shimmying of Motor Cars

What causes track motor cars to "shimmy"? What are the effects? What can be done to prevent the trouble?

Caused by Tire Wear

By Carl Thompson
Track Inspector, Great Northern, Superior, Wis.

Shimmying has been attributed to several causes, such as out-of-line, spring frames, unequal wheel diameters, bent wheels or axles, any one of which may cause track motor cars to shimmy. The one cause most commonly overlooked is the wear on the wheel treads. If this wear amounts to $\frac{1}{16}$ in. or more in the center of the treads, that is, if there is more wear in the center of the tread than at the edges, thus giving the tires a hollow or ground-out appearance, the car will dance from one side of the track to the other or shimmy, causing still more wear on the tires. It will also shake up the entire car, loosening nuts on the frame, causing discomfort to men riding on the car and tiring them.

Shimmying is more pronounced on light rail, because the narrow head of the rail seems to induce more lateral movement. To prevent shimmy until tire wear is present, requires careful handling of the car and that it shall be kept in alinement, that bent wheels and axles be replaced, and that the frame is not allowed to remain twisted or out of shape. When tire wear has advanced enough to cause shimmying, the remedy is to replace the wheels.

More Than One Cause

By C. E. Morgan
Superintendent Work Equipment and Welding, Chicago, Milwaukee, St. Paul & Pacific, Chicago

Motor cars may shimmy from one of several causes. I would first look for a difference in the diameter of the wheels on the front axle and then

check those on the rear axle. If there is a new wheel on the right rear corner of the car and a worn wheel on the left rear corner, it is almost certain that the car will either crowd the left rail, cutting off the left front-wheel flange, or it will shimmy. Many men regard the shimmy problem as always being associated with the front axle, the front wheels or the bearings. It is good policy always to renew both rear wheels when one of them requires attention. Any wear that is left in the other wheel can still be utilized on the front wheel.

The position of the thrust collars enters into the shimmy problem. Thrust collars may be tight but still have ⅛ to ¼-in. lateral play, which is not a good adjustment. Thrust collars should fit tight against the inner races, with the wheels equally spaced outside of the longitudinal sills. This must be true for both front and rear wheels. In other words, it is possible to have thrust collars tight, but both too far to the right on the rear axles and both too far to the left on the front axle, or vice versa. This would make a very poor riding car; yet nothing would be loose, and the car would probably pass the average trackman's inspection.

Anything that tends to guide the front wheels over against one rail and holds it there causes nosing. Anything that tends to lead the car over to one side where it receives sufficient lateral blow on the flange to direct it back to the opposite rail causes the car to shimmy. One thing that definitely does not enter into this problem is the gage. A car with narrow gage on the wheels, but with all other conditions correct, will never shimmy. It is true that a car with the wheel gage ½ in. narrow may stay against one rail or the other most of the time. Yet it is difficult to get a car to run exactly central, without crowding one rail or the other. It is for this reason that we have been working toward the 56¼-in. gage for motor cars.

Among the effects of shimmying are uncomfortable riding qualities, and the development of a series of little waves or ripples on the flanges of both front wheels, which, once started, do not long remain until the wheel flanges begin to wear more rapidly than normal. Furthermore, the lateral blows which the wheels receive as they weave from one rail to the other in the shimmy movement, cause an excess thrust on the axle bearings which tends to loosen the inner races from the axle.

One of the first steps toward prevention is good inspection and a consideration of all of the things that had been done to the car just before it began to shimmy, including whether wheels had been changed, whether there had been a derailment or whether the defect came on gradually. The outside diameter of the rear two wheels should be checked, a difference in diameter being one of the first things to look for. Next, see whether the front and rear axles are parallel. I would then check the distance between the side frame and all four wheels. A poor bearing arrangement, such as the old loose roller bearings which were not worked to present-day tolerances should also be considered.

Most of the foregoing items need to be considered separately, for there may be details common only to that particular car, that might affect its performance on the rails. This is an important subject, which should not be passed over by users of motor cars merely by saying that the car always did shimmy and that it must be a bad one. There is a definite reason why these things occur, and a good inspector will not only find the cause for the trouble, but will eliminate it.

Bracing Timber Trestles

Under what conditions is it desirable to apply tower and longitudinal bracing to a timber trestle? How should the brace timbers be attached?

No General Rules

By C. C. Westfall
Engineer of Bridges, Illinois Central, Chicago

General rules for bracing timber trestles longitudinally cannot be followed rigidly in all cases for, usually, each structure must be considered as a special problem. This is not true for timber trestles, such as viaducts, over dry land, but water conditions may make it impossible either to install bracing of any kind or to maintain it if it can be installed.

The Manual of the American Railway Engineering Association contains the following notes:

Framed Bents—Trestles to have longitudinal bracing for all heights. Pile Bents—Trestles more than 10 ft. high, base of rail to ground, shall have longitudinal cross bracing every second panel.

I consider that this rigid requirement cannot be justified and it is rarely practicable to put so much bracing in a trestle, since it offers too much obstruction to the flow of water. Such bracing in trestles in wooded districts would present a serious hazard by reason of the collection of drift, while in most streams in the corn belt great masses of corn stalks are sometimes carried in the streams.

Low framed trestles on good foundations do not require this large amount of longitudinal bracing. A few years ago we had about 45,000 lin. ft. of framed trestle on one section of our lines, and only a few of the higher structures had any longitudinal bracing. When such a trestle is not too long, say not more than 200 ft., the longitudinal force is checked by the end bents, which are buried in the ground or fill and which will take the thrust. Framed trestles 15 or more feet in height, will require rather heavy longitudinal bracing. Pile trestles up to 20 ft. do not require longitudinal bracing; above this height it is advisable to use longitudinal cross bracing every third panel, with longitudinal struts extending the entire length from bank to bank. Obviously, water conditions will sometimes limit even this amount of longitudinal bracing. In one extreme case on our road, we have a long trestle in a considerable depth of water, where bracing cannot be placed, so that it is necessary to keep a permanent 10-mile speed restriction on the structure.

We also have another trestle 25 ft. high, now under construction, in which it will not be possible to carry longitudinal bracing to the ground. In this case we are installing the upper story of cross bracing in every third panel and are carrying longitudinal struts at about mid-height, the full length of the trestle, using timber connectors at each bolt in the longitudinal struts to increase the stiffness of the connection.

The A.R.E.A. plans set up a scheme for fastening the bracing to the bents. This calls for all of the bracing to be bolted to the piles with two bolts at an intersection, and with struts dapped over the collar braces. This is undoubtedly a very good fastening, but I believe as good or better connections can be made with timber connectors, even with a single bolt.

Make Structure More Rigid

By Engineer of Bridges

The application of tower and longitudinal bracing to timber trestles is determined by the need for strength and rigidity in the completed struc-

ture, as well as by the probable interference such bracing may offer to the passage of drift during periods of high water. It is obvious that local conditions must be given consideration; the elevation of high water, the character of the area drained, the type of soil and similar points shall not be overlooked. Longitudinal braces should be placed on pile or framed trestles that are more than 19 ft. high and more than 100 ft. long. It is not recommended that they be placed on structures lower or shorter than this.

Sash braces should be installed on bents having heights greater than 19 ft., and should be placed at approximately 13-ft. 6-in. centers, measuring from the base of rail downward. Sway braces are to be applied between sash braces. Longitudinal braces should be continuous across the trestle and should terminate at the ground line.

Tower braces may be substituted for longitudinal braces, depending on high-water marks, volume of drift, etc. Where tower braces are installed, they should be placed at no greater intervals than every fourth panel on bridges more than 27 ft. high. Exceptional cases will demand complete tower bracing for the entire structure. The need for additional bracing increases when the bridge is on a curve and as the height increases.

The use of some type of grid or timber connector at all bolt connections in the substructure increases the efficiency of such connections. Pile and frame trestles that are braced adequately have minimum vibration, with better line and surface for the track and longer life for the structure.

Should Relaid Rail Be Turned?

Should relayer rail from tangents be reversed or laid with the original gage side in? Why?

Would Not Reverse

By A. A. Burgett
Supervisor, Erie, Huntington, Ind.

Rail generally wears more evenly on the gage side than along the outer portion of the head, and the flow of metal is less noticeable. If the rail is laid with the original gage side out, the bearing of the wheel tread on the running surface of the rail is changed, and the wheels will not cover the full width of the running surface. This not only does not make a neat appearance, but it also changes the stresses in the rail. I believe that for best overall results, the rail should be relaid in the same way it came out of the track, especially in main track. This holds true whether it is relaid over a continuous stretch of track or whether individual rails are used to replace defective or broken rails.

As It Was

By H. G. Carter
Division Engineer, Central of Georgia, Columbus, Ga.

This question has been the subject of debate among maintenance men for years, some holding one way and the remainder the other way. I believe that rail should be relaid as it was removed, that is, with the original gage side in. This is of particular importance if the head shows appreciable wear. The head will wear to conform to the worn contour of the wheels that pass over it. If the rail is turned when it is relaid, the wheels will run on the narrow or high part of the running surface. This will be on the extreme inside of the head, thus throwing all of the load on the edge of the head, where it will not be distributed properly over the web. This will tend to crack the head from the web, along the fillet between the web and the head, or break it down otherwise. Again, the weight will not be distributed properly to the base, and difficulty will arise in maintaining gage on curves. Taken all in all, better riding track, less maintenance effort and cost, and longer rail life will result from laying rail with the original gage side in.

Original Gage Side In

By C. W. Baldridge
Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

Owing to the tapered tread of locomotives and car wheels, rails wear down more on the gage side than they do along the outside corner of the head. When such rails are relaid in other tracks where reasonably full-tonnage trains are handled, it is advisable to lay them with the original gage side in. If they are reversed when they are laid, the wheel contacts will be along a narrow strip of the running surface and entirely on the inside half of the head. This position provides less bearing area between the wheels and the rail head and is likely to result in slippage of the driving wheels to such an extent that less tonnage can be handled per locomotive.

Rails that have been supported on flat tie plates will be more worn on the gage side than if they had rested on canted tie plates. When the rail is relaid, canted tie plates will increase the width of bearing on the rail head if the rail is reversed, but whether on flat or canted tie plates, the width of the bearing will not be so great on reversed rail as on rail that is relaid with the original gage side in.

Reverse the Rail

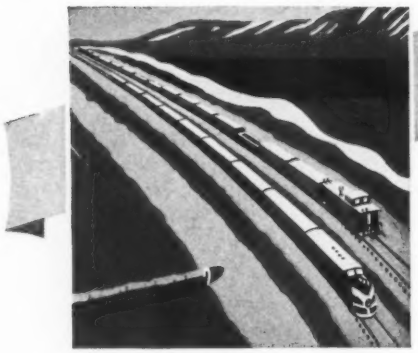
By Troy West
Engineer of Track, Union Railroad, East Pittsburgh, Pa.

When rail released from tangents is relaid in level track where heavy trains are not stopped and started frequently, the rail should be reversed. Usually, rail from tangents, that has been maintained to good surface, line and gage, has a uniformly worn head. It is wholly improbable that in relaying, the rails will be placed in their original order so that, because of the normal irregularities in wear, the joints will not be as smooth if the original gage side is laid in, as if the rail is reversed. Even with new rail, variations in height occur, and it is money well spent to grind the joints to an even surface, since this will reduce future maintenance. Relaying rail should have no visible defects, should provide proper adhesion and should be good for a minimum of 8 to 10 years service in the track in which it is to be laid.

Should Be Turned

By W. H. King
Section Foreman, Missouri Pacific Lines, Francitas, Tex.

Unless rails can be match-marked and relaid in exactly the same sequence as they were when they were released, they should be turned. It is so nearly impossible to reproduce the same sequence with relaid rail, because some rails will be degraded or classed as scrap, while those that are to be used become mixed in loading and unloading. Again no two rails wear exactly alike, thus causing undesirable joint conditions if they are laid without turning. If the rails are turned, the track will ride more smoothly, the rails will last longer and the maintenance effort will be reduced.



NEWS of the Month

Names Transport Study Board

President Roosevelt, on March 20, sent to the Senate for confirmation the names of Wayne Coy of Indiana, Charles West of Ohio and Nelson Lee Smith of New Hampshire as members of the Transportation Study Board called for in the Transportation Act of 1940. Mr. Coy is now serving as Assistant Federal Security Administrator, while Mr. West is a former Democratic member of Congress from Ohio and former Under-Secretary of the Interior and most recently served as liaison man between the President and Congress. Mr. Smith is at present chairman of the New Hampshire Public Service Commission and is a former professor of economics at Dartmouth College.

Saboteurs Derail Pennsylvania Express

On March 16, Pennsylvania train No. 316—"The Buckeye"—eastbound express from Cleveland, Ohio, to Pittsburgh, Pa., was derailed at 9:03 p.m. about one mile east of Baden, Pa., as the result of skilled sabotage. Five persons, the engineer, two other employees and two passengers were killed and 75 persons, many of whom were injured seriously, were treated for shock, exposure and injury.

At the point of the accident the tracks parallel the Ohio river and are about 30 ft. above the water. The Buckeye was traveling on track No. 1 (nearest the river) at an estimated speed of 60 to 65 m.p.h. The saboteurs had pulled all spikes on both sides of one rail and uncoupled the angle bars, forcing the end of the rail, facing the on-coming locomotive, inward 22 in., without breaking the bond wire or affecting the operation of the signals. The engine turned over on its side, a baggage car and coach plunged into the river, the third car remained upright with one end on the river bank and with the water at the floor level at the lower end, while the last two cars were derailed but remained upright and clear of the water.

Mediation Board Working on Rail-Labor Dispute

On March 14 the National Mediation Board proffered its services in connection with disputes between railway labor and management growing out of the demand of the 14 non-operating unions for vacations with pay and the Western railroad's counter-proposal for a 10 per cent reduction in wage rates. Meetings with the Mediation Board began on March 19. Under the terms of the Railway Labor Act, if the Mediation Board fails to bring the parties in the dispute to an agreement, the dispute may then be submitted to arbitratioan, or if either side declines to arbitrate, the President then appoints a fact-finding board, which reports to him within 30 days.

Capital Expenditures in 1940

Capital expenditures made by Class I railroads in 1940 totaled $429,147,000, the largest amount for any year since 1937 and an increase of $167,118,000 over 1939. Capital expenditures for roadway and structures in 1940 totaled $157,241,000, an increase of $28,600,000 compared with the preceding year. Among these expenditures was $30,473,000 for heavier rail, an increase of approximately $4,000,000 over 1939, and $22,596,000 for bridges, trestles and culverts, compared with $21,196,000 in 1939. In addition, nearly $5,000,000 was spent for additional ballast and nearly $8,000,000 for improvements to station and office buildings and other station facilities. For other improvements to roadway and structures, capital expenditures amounted to $52,320,000 contrasted with $38,087,000 for such expenditures in the preceding year.

General Fleming Discusses Wage Philosophy

Some of the basic reasoning which motivated General Philip B. Fleming, Wage and Hour Administrator, in reaching his decision to promulgate a 36 and 33-cent minimum hourly wage for the railroad industry, which went into effect on March 1 and which was reported in the February issue, is revealed in his findings and opinion which have just been made public.

"I have concluded," writes General Fleming, "that in so far as financial and economic conditions in the industry are relevant, both give every sign of improvement.—Such few railroads as actually show some basis for argument that they may be forced to discontinue operations if their costs of operation are increased are admittedly in narrow straits, but in straits so narrow that if they should abandon their lines it could hardly be said to be a proximate result of this wage increase.—It has been my opinion that in the great majority of cases railroad policy-makers either will find it unwise to mechanize merely to meet the wage increase, or as alert managers will have intended to take every advantage of the economies available from industrial rationalization anyway. Since curtailment of employment will not be great as a result of the order herein made, the only effect will be—the respective amounts going to railway ownership and railway labor, for their participation in owning, operating and maintaining the American Railroad System, will suffer a change, the amount going to railway labor slightly increasing and the amount going to the other interests slightly decreasing."

Annual Cost of Furnishing Section Houses

In a ruling rising out of a petition filed by the Atlanta, Birmingham & Coast asking that such a determination be made, Harold Stein, examiner of the Wage and Hour division, has recommended to the Administrator certain findings relative to costs of furnishing housing facilities, which may be reported as part of the wages paid to maintenance-of-way employees. After a detailed discussion of the original cost of the structures, the depreciation, cost of maintenance and taxes, Examiner Stein makes the following determination of the annual cost of furnishing four types of housing to the A. B. & C. employees:

Class I houses	$34.88
Class II houses	31.12
Class III houses	27.56
Boxcars	16.69

At the hearing held before the examiner on October 17, 1940, the company submitted the following schedule which it felt should be allowed as the cost of furnishing the various types of housing:

Class I houses	$100.40
Class II houses	81.52
Class III houses	63.85
Boxcars	49.73

These figures contrast with the annual charges which the company had been deducting from wages for housing prior to the hearing, as follows:

Class I houses	$68.85
Class II houses	56.61
Class III houses	39.78
Boxcars	33.66

The examiner points out that the latter figures differ from those proposed at the hearing in that they were based upon a lower figure for cost of reproduction new, a lower depreciation charge, a lower tax and insurance charge, and a lower estimate of maintenance expenditure.

Personal Mention

General

A. M. Harris, supervisor of track on the Pennsylvania at Johnstown, Pa., has been promoted to assistant superintendent of freight transportation of the Western region, a newly created position, with headquarters at Chicago.

Anton Anderson, chief engineer of the Chicago, Indianapolis & Louisville (Monon), has been appointed also assistant chief operating officer, with headquarters as before at Lafayette, Ind. Mr. Anderson was born at Lafayette, on October 12, 1879, and graduated in civil engineering from Purdue University in 1901. After working a year for the American Bridge Company, at St. Louis, Mo., Mr. Anderson entered railway service in 1902 as a draftsman for the Choctaw, Oklahoma & Gulf (now part of the Chicago, Rock Island & Pacific). In the following year

Anton Anderson

he became office engineer and masonry engineer for the Indianapolis Northern Traction Company, and in January, 1903, he became engaged on location work for the Midland Valley. In August, 1904, he was appointed city engineer at Lafayette, later resigning this position to become resident engineer at the same place for the Chicago, Indianapolis & Louisville. On this road he advanced successively through the positions of engineer of construction, assistant engineer, division engineer, valuation engineer, and principal assistant engineer, with headquarters at Chicago. In August, 1918, he was made corporate engineer and in March, 1920, he was promoted to engineer of maintenance of way, with headquarters at Lafayette. Mr. Anderson was promoted to chief engineer, with the same headquarters, on February 1, 1938.

Engineering

E. G. Brisbin, supervisor of track on the New York Central (Michigan Central) at Jackson, Mich., has been promoted to assistant division engineer, with headquarters at Bay City, Mich., a newly created position.

H. D. Clark, assistant engineer on the Baltimore & Ohio Chicago Terminal at Chicago, has been promoted to assistant engineer of bridges and buildings, with the same headquarters, succeeding **Homer A. Field,** whose death on February 13 was announced in the March issue.

Winslow A. Kingman, office engineer on the Eastern lines of the Atchison, Topeka & Santa Fe, has been promoted to district engineer of the Western district of the Eastern lines, with headquarters as before, at Topeka, Kan., succeeding **John L. Starkie,** who has been transferred to Galveston, Tex.

A. H. Stimson, division engineer on special duty in the office of the chief engineer of the Pennsylvania, at Philadelphia, Pa., has been appointed division engineer, with headquarters at Fort Wayne, Ind., succeeding **C. O. Long,** whose death on March 11 is announced elsewhere in these columns.

R. T. Blewitt, structural designer on the New York, Chicago & St. Louis (Nickel Plate), has been promoted to designing engineer, with headquarters at Cleveland, Ohio, succeeding **O. E. Hager,** whose promotion to engineer of bridges and structures of the Pere Marquette, with headquarters at Detroit, Mich., was announced in the January issue.

D. F. Apple, assistant division engineer on the Chesapeake & Ohio, was appointed acting division engineer, effective February 16, with headquarters as before at Covington, Ky., in place of **T. S. Pattison,** who has been called for military service. **R. L. Milner,** supervisor of track, with headquarters at Peach Creek, W. Va., has been appointed acting assistant division engineer, with headquarters at Covington, Ky., to succeed Mr. Apple.

C. V. Chamberlin, assistant engineer on the staff of the division engineer of the Electric division of the New York Central, has been promoted to assistant division engineer of the same division, with headquarters as before at New York, succeeding **P. T. Jones,** whose death is noted elsewhere in these columns. **C. M. Gregg,** assistant supervisor of track, with headquarters at New York, has been appointed assistant engineer at the same point to succeed Mr. Chamberlin.

Joseph W. Smith, principal assistant engineer of the Erie, has been promoted to chief engineer, with headquarters as before at Cleveland, Ohio, succeeding **George S. Fanning,** whose death on January 2, was announced in the February issue. Mr. Smith was born at Hazleton, Pa., on August 8, 1879, and graduated in civil engineering from Lafayette College in 1904. He entered railway service with the Erie in June of that year as a transitman on preliminary surveys, and in September, 1905, he was promoted to an inspector on construction work. In February, 1907, he was promoted to resident engineer on terminal improvements, later serving on double track and grade reduction work, and in February, 1912, he was promoted to assistant engineer on double track and grade reduction work. In January, 1914, he was advanced to district engineer on terminal improvements, with headquarters at New York City, and in February, 1917, he was further promoted to assistant valuation engineer. In June, 1925, he was promoted to general office engineer, and four years later he was

Joseph W. Smith

advanced to principal assistant engineer, with headquarters at New York. His headquarters were later transferred to Cleveland.

L. T. Nuckols, whose promotion to assistant chief engineer of the Chesapeake & Ohio, with headquarters as before at Richmond, Va., was reported in the February issue, was born on December 12, 1890, near Rockville, Va., and, after attending the local schools, he completed his education at Parkersburg, W. Va. He first entered railway service on July 1, 1907, with the South & Western (now the Clinchfield). Subsequently he entered the service of the Louisville & Nashville, where he was engaged in location and construction work, advancing from chainman to assisting locating engineer. For 18 months, beginning in 1915, Mr. Nuckols served with the Bureau of Valuation of the Interstate Commerce Commission, leaving the commission to enter the service of the C. & O. on October 3, 1916, as

L. T. Nuckols

resident engineer on construction of the line from Man, W. Va., to Gilbert, subsequently being connected with various other heavy construction projects in West Virginia. On November 20, 1923, Mr. Nuckols was promoted to district engineer at Ashland, Ky., being appointed resident engineer at Huntington, W. Va.,

on January 1, 1932. On October 6 of the latter year, he was appointed assistant division engineer at Ashland, being promoted to division engineer at the same point on June 1, 1936. He was appointed engineer of track on June 1, 1939.

Thomas L. Phillips, whose promotion to chief engineer, of the Western Pacific, with headquarters at San Francisco, Cal., was announced in the March issue, was born in Alsea, Ore., on December 28, 1881, and completed a correspondence course in civil engineering. In 1902 he served as an axman, rodman and instrumentman for the Pokegima Sugar Pine Lumber Co., in Siskiyou county, Cal., and later in that year entered railway service, serving for several years on railroad location and construction for a number of railways in Northern California, including the Atchison, Topeka and Santa Fe, the McCloud River Railroad, and the Albion Lumber Company Railroad.

On November 20, 1905, Mr. Phillips went with the Western Pacific as resident construction engineer at Niles, Cal., and from 1908 to 1909 he was assistant engineer in charge of the construction of the Western Pacific lines, wharfs and other terminal facilities in San Francisco. After the completion of the construction of the Western Pacific, he continued to serve as assistant engineer on location and construction. From 1918 to 1920, during the period of Federal control, he was division engineer of the Western division, with headquarters at Sacramento, Cal. Be-

Thomas L. Phillips

tween July, 1920, and July, 1921, he took a leave of absence to serve as chief engineer of the Hutchinson Lumber Company on the location and construction of a 25-mile railroad from Land, Cal., to Feather Falls. On the latter date he returned to the Western Pacific as assistant engineer, and in June, 1927, he was promoted to principal assistant engineer.

Charles H. Blackman, principal assistant engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., has been promoted to assistant chief engineer, a newly created position, with the same headquarters, and **George T. Tate,** assistant engineer in the chief engineer's office at Louisville, has been promoted to principal assistant engineer, succeeding Mr. Blackman. **Howard C. Forman,** assistant division engineer at Middlesboro, Ky., has been advanced to assistant engineer at Louisville, replacing Mr. Tate, and **J. McClure Salmon, Jr.,** assistant supervisor of bridges and buildings at Louisville, has been promoted to assistant division engineer at Middlesboro, relieving Mr. Forman.

Mr. Blackman was born at Nashville, Tenn., on September 6, 1881, and attended Vanderbilt University. While at Vanderbilt, he worked as a chainman and a rodman on construction for the Tennessee Central during the summer of 1899 and the summer and fall of 1900. On May 13, 1901, he went with the L. & N. as a rodman on its Louisville division, later

Charles H. Blackman

being promoted to instrumentman, draftsman and assistant engineer of its Pensacola division. On March 1, 1906, he was transferred to the chief engineer's office, and a year later he was appointed resident engineer of construction at Birmingham, Ala. Mr. Blackman later returned to the chief engineer's office, as assistant engineer, and on October 1, 1914, he was advanced to principal assistant engineer, which position he has held until his recent promotion. Mr. Blackman organized the Kentucky section of the American Society of Civil Engineers and served as its first secretary and chairman of its Membership committee for several years. He is a past-president of the Engineers and Architects Club of Louisville, Kentucky.

Track

T. C. Coleman has been appointed roadmaster on the Gulf, Colorado & Santa Fe at Silsbee, Tex., succeeding **J. W. Soward,** deceased.

G. L. Condie has been appointed roadmaster on the Union Pacific, with headquarters at Cache Junction, Utah, and **H. F. Buel** has been appointed assistant roadmaster at Salt Lake City, Utah.

J. M. Collins, supervisor of track on the Pennsylvania at Petoskey, Mich., has been transferred to Columbus, Ohio, succeeding **L. F. Beard,** who, in turn, has been transferred to Petoskey, replacing Mr. Collins.

J. A. Blalock, assistant on the engineering corps of the Eastern region of the Pennsylvania, has been promoted to assistant supervisor of track at Columbus, Ohio, succeeding **Kenneth Lieber,** who has been transferred to Johnstown, Pa.

L. A. Walls has been appointed track supervisor on the Nashville, Chattanooga & St. Louis at Dickson, Tenn., succeeding **W. A. Nelson,** who has retired.

C. W. Jenkins has been appointed district roadmaster on the Wheeling & Lake Erie, with headquarters at Canton, Ohio, succeeding **B. A. Schnurr,** deceased.

I. D. Holmes, acting track supervisor on the Illinois Central at Dyersburg, Tenn., has been promoted to track supervisor at that point, succeeding **C. S. Ward,** who has retired on pension.

A. F. Knauf, assistant supervisor of track on the New York Central (Michigan Central) at Three Oaks, Mich., has been promoted to supervisor of track, with headquarters at Bay City, Mich.

C. A. Peterson has been appointed assistant supervisor of track on the Pittsburgh & Lake Erie, with headquarters at McKees Rocks, Pa., to succeed **Edward L. Pfrom,** who retired from active service on January 31.

Burman Johnson, a section foreman on the Chesapeake & Ohio, has been promoted to supervisor of track, with headquarters at Peach Creek, W. Va., to succeed **R. L. Milner,** whose appointment as acting assistant division engineer is noted elsewhere in these columns.

C. V. Talley, assistant engineer on the New York Central (Big Four) at Cincinnati, Ohio, has been promoted to track supervisor on the Illinois division, with headquarters at Harrisburg, Ill., succeeding **J. W. Vest,** who has been transferred to the Peoria & Eastern as a track supervisor.

W. C. Morris, assistant roadmaster on the Southern at Louisville, Ky., has been promoted to roadmaster at Selma, Ala., succeeding **J. F. Barron,** who has been transferred to Hattiesburg, Miss., relieving **H. A. Metcalfe. G. A. McRoberts,** assistant roadmaster at Hattiesburg, has been transferred to Louisville, replacing Mr. Morris. The position of assistant roadmaster at Hattiesburg has been abolished.

Clifford C. Brown, assistant roadmaster on the Chicago & North Western at Mason City, Iowa, has been promoted to roadmaster at Norfolk, Neb., succeeding **A. W. Hyland,** who has been transferred to Fremont, Neb. Mr. Hyland replaces **R. B. Johnson,** who has been transferred to subdivision No. 3 at Fond du Lac, Wis., relieving **B. F. Hager,** who in turn has been transferred to subdivision No. 4, with the same headquarters, succeeding **William Flynn.** Mr. Flynn has been transferred to Escanaba, Mich., relieving **John J. Dwyer,** who retired on March 1.

J. W. Buford, assistant supervisor of track on the Maryland division of the Pennsylvania, has been promoted to branch line supervisor of track on the Cleveland division, with headquarters at Akron, Ohio, succeeding **J. F. Piper,** who

has been promoted to main line supervisor of track at Terre Haute, Ind., succeeding **W. P. Conklin,** who has been transferred to Chicago. Mr. Conklin replaces **H. W. Manning,** who has been transferred to Johnstown, Pa., relieving **A. M. Harris,** whose promotion to assistant superintendent of freight transportation of the Western region, with headquarters at Chicago, is announced elsewhere in these columns. **A. M. Schofield,** assistant on the engineering corps of the Central region, has been promoted to assistant supervisor of track on the Erie & Ashtabula division, to succeed **W. W. Worthington,** who has been transferred to the Maryland division to replace Mr. Buford.

Charles L. Campman, a track foreman on the New York Central, has been promoted to assistant supervisor of track on the River division, with headquarters at Weehawken, N. J., to replace **F. B. Cox,** who has been transferred to the Electric division, with headquarters at New York. Mr. Cox replaces **C. M. Gregg,** whose appointment as assistant engineer is noted elsewhere in these columns.

Bridge and Building

C. A. J. Richards, master carpenter on the Pennsylvania, with headquarters at Chicago, has been transferred to Grand Rapids, Mich., succeeding **H. F. Potts,** who has been transferred to Fort Wayne, Ind., relieving **D. C. D. Todd.** Mr. Todd has been transferred to Chicago, replacing Mr. Richards.

P. R. Eastes, draftsman in the chief engineer's office of the Louisville & Nashville at Louisville, Ky., has been promoted to assistant supervisor of bridges and buildings, with the same headquarters, succeeding **J. McClure Salmon, Jr.,** whose promotion to assistant division engineer, with headquarters at Middlesboro, Ky., is announced elsewhere in these columns.

N. R. Tucker, assistant supervisor of bridges and buildings on the Southern Pacific Lines in Texas and Louisiana at Lafayette, La., has been promoted to supervisor of bridges and buildings at that point, succeeding **A. B. Ashmore,** who retired on March 2, and **S. L. Martin,** instrumentman at Lafayette, has been advanced to assistant supervisor of bridges and buildings at that point, relieving Mr. Tucker.

Obituary

P. T. Jones, assistant division engineer of the Electric division of the New York Central, with headquarters at New York, died on February 21.

Herman J. Pfeiffer, consulting engineer, and until February 17, chief engineer of the Terminal Railroad Association of St. Louis, died in that city on March 16, after a six month's illness.

C. O. Long, division engineer on the Pennsylvania at Ft. Wayne, Ind., was killed in an automobile accident at Waco, Tex., on March 11. Mr. Long was on a vacation trip with his wife, who was also killed in the accident.

Association News

Bridge and Building Association

A meeting of the Executive committee will be held in Chicago on Monday, April 28, to review the status of the work under way by the various committees to make report at the convention next October, and to take up such routine association business as may require attention.

Metropolitan Maintenance of Way Club

The club will hold its annual meeting at the Hotel Governor Clinton, New York, on April 22. Following dinner, which will be served at 6:30, the meeting will be addressed by H. J. Weccheider, division engineer on the Erie at Hornell, N.Y., who will describe ballasting and ballast-cleaning operations on the Erie. Another feature of the meeting will be the election of officers for the ensuing year.

Railway Tie Association

Plans are being completed for the convention which will be held at the Arlington Hotel, Hot Springs, Ark., on May 21-22. At this meeting, consideration will be given to the reports of committees on Checking and Splitting; Changes in Dimensions of Cross Ties; Timber Conservation; Manufacturing Practice; Moisture Gradient and Specifications. A new committee will also report on Mechanical Equipment. The annual banquet will be held on the evening of May 21, at which time Col. Robert S. Henry, assistant to the president, Association of American Railroads, will present an address.

Maintenance of Way Club of Chicago

One hundred and twenty-nine members and guests were in attendance at the meeting on March 24, which was addressed by C. G. Grove, chief engineer maintenance of way of the Western region of the Pennsylvania, on What High-Speed Trains Mean to the Trackman. In his remarks, Mr. Grove stressed the importance of an adequate roadbed section; good track and roadbed drainage; an adequate clean ballast section; much greater refinement in line, gage and surface; a high standard of turnout and crossing maintenance; and a high esprit de corps among the track forces. The next meeting of the club, which will be the annual meeting with election of officers, will be held on April 28.

American Railway Engineering Association

At the annual convention of the association in Chicago on March 11-13, with a total of 1,218 members and guests in attendance, it was announced that the following officers had been elected for the ensuing year: President, F. L. C. Bond, vice-president and general manager, Central region, C. N. R., Toronto, Ont.; vice-president to serve two years, W. F. Cummings, chief engineer, B. & M., Boston, Mass.; directors, F. S. Schwinn, assistant chief engineer, M. P., Houston, Tex.; Elmer T. Howson, editor, *Railway Engineering and Maintenance,* Chicago; and B. R. Kulp, chief engineer, C. & N. W., Chicago. H. R. Clarke, engineer maintenance of way, C. B. & Q., Chicago, and vice-president of the association, was advanced automatically to senior vice-president, succeeding Mr. Bond.

With the close of the convention, upon action taken by the Board of Direction, two committees, those on Stresses in Railroad Track and on Rules and Organization, were discontinued; the Special Committee on Clearances was made a standing committee, and a new committee, known as the Committee on Research Administration, came into being. The principal function of the new committee is to exercise general supervision over such research work of the Engineering division as is administered by the research engineer of the division, insofar as it relates to assignments of A. R. E. A. committees.

The Committees on Outline of Work and Personnel have completed the make-up of committees and the assignment of subjects for the ensuing year, and the booklet containing the assignments and personnel of committees will be mailed to all members of committees during the first week in April. Among other things, the booklet shows the following special and standing committees and their chairmen, and the new subjects that have been assigned to these committees. Among the chairmen of the committees, those designated by asterisks have been newly appointed:

Roadway and Ballast; A. E. Botts, asst. engr. m. of w., C. & O., Richmond, Va., chairman. New subjects—Corrugated metal culverts, particularly types for special conditions; Specifications for perforated pipe for subdrainage; Specifications for multiple or sectional plate pipe and arches; Formation of the roadway, covering recent grading projects; The maintenance of tunnels; The extent of the use of concrete fence posts; Laws on right-of-way fences; Adherence to recommended practice for cleaning foul ballast; and The relationship of the quality of ballast material, as determined by service conditions and the Los Angeles testing machine.

Ties; John Foley, forester, Penna., Philadelphia, Pa., chairman.

Rail; W. H. Penfield, ch. engr., C. M. St. P. & P., Chicago, chairman. New subjects—The development and characteristics of fractures under engine burns in rail, together with investigation of the effectiveness of welding up engine burns by the oxy-acetylene and electric arc methods.

Track; W. G. Arn, asst. engr. I. C., Chicago, chairman. New subjects — Photo-elastic study of stresses in tie plates; and Testing methods.

Buildings; L. H. Laffoley, asst. engr. of bldgs., C. P., Montreal, Que., chairman. New subjects—Modernization of station buildings; and Design of facilities and equipment for the spray painting of rolling stock.

Wood Bridges and Trestles; R. P. Hart*, br. engr., M. P., St. Louis, Mo., chairman.

Masonry; J. F. Leonard, engr. of bridges and bldgs., Penna., Pittsburgh, Pa., chairman.

Highways; J. G. Brennan, engr. of grade crossings, Association of American Railroads, Washington, D. C., chairman. New subjects—Requisites for the location, number and arrangement of automatic signals, automatic gates and auxiliary signs for rail-highway grade crossing protection.

Signals and Interlocking; H. G. Morgan, sig. engr., I. C., Chicago, chairman.

Records and Accounts; C. A. Knowles, valua. engr., C. & O., Richmond, Va., chairman.

Water Service, Fire Protection and Sanitation; B. W. DeGeer, engr. water service, G. N., St. Paul, Minn., chairman. New subjects—Methods for cleaning sewers and underground pipe lines; Practicable size of water columns and supply lines for maximum delivery of water to locomotive tenders; and Revised specifications for cast iron pipe.

Yards and Terminals; C. H. Mottier, engr. asst. to vice-pres., I. C., Chicago, chairman. New Subjects—Produce terminals; Effect of the lengthening of locomotive runs on the location and arrangement of locomotive servicing facilities; and the Modernization of passenger terminals.

Iron and Steel Structures; J. E. Bernhardt*, bridge engr., C. & E. I., Chicago, chairman.

Economics of Railway Location and Operation; H. M. Stout, asst. valua. engr., N. P., St. Paul, Minn., chairman.

Wood Preservation; H. R. Duncan, supt. timber preservation, C. B. & Q., Galesburg, Ill., chairman. New subjects—Reasons for and extent of the use of creosote-petroleum mixture treatment; Specifications for creosote-petroleum treatment; Use of straight tar for tie treatment and results obtained; and Review the specifications for creosote with attention to changes in the process of manufacture and with regard to limiting the residue above 355 deg. C.

Electricity; H. F. Brown, asst. elec. engr., N. Y. N. H. & H., New Haven, Conn., chairman.

Uniform General Contract Forms; W. G. Nusz, asst. engr., I. C., Chicago, chairman. New subjects—Form of agreement for advertising signs on the railways, including signs in coaches.

Economics of Railway Labor; G. M. O'Rourke, dist. engr., Northern lines, I. C. Chicago, chairman. New subjects—Labor economies to be secured by providing section gangs with labor-saving machines and the minimum size of gang to be so equipped; Labor economies to be derived from stabilization of the roadbed through means other than drainage; and the relative economy in labor for maintaining ballast deck vs. open-deck bridges and trestles, and approaches thereto.

Co-operative Relations with Universities; Elmer T. Howson, editor, *Railway Engineering and Maintenance*, Chicago, chairman.

Waterways and Harbors; G. P. Palmer*, engr. m. and constr., B. & O., Chicago Terminal, Chicago, chairman.

Standardization; F. L. Nicholson, ch. engr. N. S., Norfolk, Va., chairman.

Maintenance of Way Work Equipment; G. R. Westcott, asst. engr., M. P., St. Louis, Mo., chairman. New subjects—New developments in roadway machines; color of roadway machines; Push cars and trailer cars; Mowing machines; Wire rope used with work equipment; Power spike pullers; and Power and bounding drills.

Clearances; A. R. Wilson, engr. b. & b., Penna., Philadelphia, Pa., chairman.

Waterproofing of Railway Structures (special); J. A. Lahmer, sr. asst. engr., M. P., St. Louis, Mo., chairman.

Impact (special); J. B. Hunley, engr. of str., N. Y. C., (west of Buffalo), Chicago, chairman. New subjects—Analysis of additional data from impact tests; and Determination of damping factors of steel spans and the variation in amount of damping with change in loading, by means of tests with an oscillator and model tests.

Only two committees have thus far made arrangements for meetings in April, these being the Committee on Water Service, Sanitation and Fire Protection, at St. Louis, Mo., on April 8, and the Committee on Buildings, at Montreal, Que., on April 21-22.

The next convention of the association will be held in Chicago on March 17, 18 and 19, 1942.

Roadmasters' Association

A meeting of the Executive committee of the association was held in Chicago on Monday, March 10, at which time a number of routine and special matters pertaining to association activities were given consideration, including the completion of the personnel of committees to study and present reports at the convention next September, and final consideration to typographical changes to be made in the annual Proceedings. As the result of this meeting, President J. J. Clutz (Pennsylvania), has announced the following personnel of committees:

Gravel Ballast—It's Requirements and Preparation—E. J. Brown (chairman), dist. engr. maint., C. B. & Q., Galesburg, Ill.; G. L. Griggs (vice-chairman), rdm., C. B. & Q., Hannibal, Mo.; J. J. Alberts, gen'l. for., C. M. St. P. & P., Chicago; E. L. Banion, rdm., A. T. & S. F., Marceline, Mo.; A. R. Bookout, asst. rdm., Sou., Charlotte, N.C.; A. E. Botts, asst. engr. M. of W., C. & O., Richmond, Va.; P. I. Buser, rdm., C. R. I. & P., Estherville, Ia.; R. H. Campbell, stud. apprentice, Sou., Spartanburg, S.C.; A. B. Chaney, dist. engr., M. P., Little Rock, Ark.; W. E. Chapman, supv'r. C. of G., Columbus, Ga.; C. O. Enlow, rdm., A. T. & S. F., Lubbock, Tex.; J. G. Gilley, supv'r., C. & O., Pikeville, Ky.; H. H. Gudger, rdm., M. P., Monroe, La.; W. H. Hillis, asst. ch. oper. off., C. R. I. & P., Chicago; J. D. Jacobs, supv'r., I. C., Decatur, Ill.; J. B. Kelly, gen'l. rdm., M. St. P. & S. S. M., Stevens Point, Wis.; G. H. Morley, rdm., M. P., Navasota, Tex.; R.T. Rumbold, b. & b. supv'r., Sou., Greensboro, N. C.; T. H. Smith, supv'r. L. & N., Russellville, Ky.; J. T. Stotler, rdm., N. P., Spokane, Wash.; E. E. R. Tratman, Wheaton, Ill.; and A. W. Wehner, rdm., S. P., Lake Charles, La.

Roadway Machines—Off-Track Vs. On-Track Types—A. L. Kleine (chairman), rdm., D. & R. G. W., Helper, Utah; C. J. Jaeschke (vice-chairman), div. engr., M. P., Little Rock, Ark.; M. R. Black, supv'r., L. & N., Etowah, Tenn.; E. J. Brown, dist. engr., C. B. & Q., Galesburg, Ill.; A. L. Campbell, rdm., S. P., Alturas, Cal.; M. H. Dick, eastern editor, *Railway Engineering and Maintenance*, New York; W. T. Elmes, rdm., P. & L. E., Pittsburgh, Pa.; W. O. Frame, supt., C. B. & Q., Centerville, Ia.; E. A. Gill, supv'r., Sou., Batesburg, S. C.; J. K. Hamilton, div. engr., D. S. S. & A., Marquette, Mich.; T. E. Meadows, supv'r., Sou., Emporia, Va.; A. G. Reese, engr. m. of w., C. & S., Denver, Colo.; F. E. Schaumburg, rdm., C. & N. W., West Chicago, Ill.; W. Smock, supv'r., Sou., Somerset, Ky.; H. L. Standridge, supv'r., C. R. I. & P., Little Rock, Ark.; G. E. Stewart, rdm., S. P., Merced, Cal.; F. W. Tomlinson, Jr., transitman, Penna., New York; T. L. Williamson, rdm., S. P., Winnemucca, Nev.; W. C. Radford, supv'r., Sou., Chester, S. C.; W. L. D. Johnston, supv'r., Sou., Shelby, N. C.; and D. H. Whisler, asst. engr., Penna., Philadelphia, Pa.

Recent Developments in Renewal of Ties—F. G. Campbell (chairman), asst. ch. engr., E. J. & E., Joliet, Ill.; W. A. Gunderson (vice-chairman), dist. mtce. engr., C. R. I. & P., El Reno, Okla.; N. F. Alberts, gen'l. for., C. M. St. P. & P., Chicago; H. F. Elliott, rdm., S. P., Ogden, Utah; J. W. Fulmer, asst. engr., Sou., Washington, D. C.; G. J. Giles, supv'r., L. & N., Harlan, Ky.; J. D. Henley, supv'r., Sou., Keysville, Va.; A. B. Hillman, engr. m. of w., C. & W. I., Chicago; N. D. Howard, managing editor, *Railway Engineering and Maintenance*, Chicago; R. S. Kniffen, gen'l. rdm., G. N., Duluth, Minn.; N. B. Lewis, asst. supv'r., Sou., Alexandria, Va.; H. P. Mason, supv'r., B. & M., Boston, Mass.; Wm. O'Brien, supv'r., P. M., Toledo, Ohio; E. L. Potarf, asst. supt., C. B. & Q., Sterling, Colo.; W. R. Sparks, gen'l track insp., C. & O., Russell, Ky.; J. S. Vreeland, associate editor, *Railway Engineering and Maintenance*, Chicago; and P. Chicoine, rdm., C. P., Vaudreuil, Que.

Present-Day Drainage Requirements—Roadway and Channel—W. B. Bailes (chairman), supv'r., Sou., Charlottesville, Va.; P. L. Koehler (vice-chairman), div. and channel engr., C. & O., Ashland, Ky.; A. N. Burgett, supv'r., Erie, Huntington, Ind.; H. C. Fox, supv'r., Sou., Spartanburg, S. C.; J. W. Hopkins, supv'r., B. & L. E., Greenville, Pa., T. F. King, rdm., Sou., Asheville, N. C.; G. B. McClellen, rdm., T. & P., Marshall, Tex.; F. H. Masters, ch. engr., E. J. & E., Joliet, Ill.; G. M. O'Rourke, dist. engr., I. C., Chicago; O. V. Parsons, asst. engr., N. & W., Roanoke, Va.; M. W. Rector, vice-pres., W. H. Nichols Co., Dallas, Tex.; G. S. Turner, engr. m. of w., D. & S. L., Denver, Colo.; F. G. Walter, asst. engr., I. C., Chicago; A. E. Hendrix, supv'r., Sou., Clarksville, Va.; C. M. Burpee, managing editor, *Railway Engineering and Maintenance Cyclopedia*, Chicago; C. R. Schoenfield, rdm., C. B. & Q., Aurora, Ill.; L. J. Gilmore, rdm., G. N., Superior, Wis.; and J. Cranford, rdm., M. P., Hope, Ark.

Rail End Wear—Causes and Correction—C. W. Baldridge (chairman), asst. engr., A. T. & S. F., Chicago; J. H. Dunn (vice-chairman), rdm., N. Y. C. & St. L., Ft. Wayne, Ind.; G. W. Benson, supv'r., b. & b., C. of G., Macon, Ga.; R. W. Bonney, gen'l rdm., S. A. L., Jacksonville, Fla.; M. D. Carothers, div. engr., Alton, Bloomington, Ill.; M. L. Denny, supv'r., I. U.,

(Continued on page 298)

Indianapolis, Ind.; H. E. Durham, rdm., K. C. S., Pittsburg, Kan.; F. L. Etchison, gen'l. rdm., A. C. L., Rocky Mount, N. C.; R. H. Gilkey, div. engr., C. of Ga., Savannah, Ga.; W. Goodwin, III, supv'r., Sou., Winston-Salem, N. C.; W. H. Haggerty, supv'r., N. Y. N. H. & H., New Rochelle, N. Y.; G. S. King, supv'r., Sou., Blackville, S. C.; J. D. Kirkland, supv'r., C. R. I. & P., Topeka, Kan.; F. B. Lafleur, rdm., S. P., Lafayette, La,; W. H. McNairy, supv'r., Sou., Branchville, S. C.; J. M. Miller, div. engr., W. M., Cumberland, Md.; P. F. Muller, rdm., C. & W. I., Chicago; D. V. O'Connell, rdm., C. & N. W., Chicago; C. W. Russell, rdm., Sou., Greenville, S. C.; L. M. Denny, supv'r., N. Y. C., Indianapolis, Ind.; G. L. Sitton, ch. engr. m. w. & s., Sou., Charlotte, N. C.; and J. A. Rust, rdm., Sou., Winston-Salem, N. C.

Maintaining Right-of-Way Fences—Organization and Methods—F. J. Meyer (chairman), rdm., N. Y. O. & W., Middletown, N. Y.; L. C. Blanchard (vice-chairman), rdm., C. M. St. P. & P., Spencer, Ia.; L. L. Smith, rdm., C. B. & Q., Centralia, Ill.; R. W. Lucas, rdm., C. R. I. & P., Manly, Ia.; J. F. Ryan, supv'r., D. & H., Plattsburg, N. Y.; C. Halversen, rdm., G. N., Grand Forks, N. D.; T. N. Turner, rdm., M. P., Newport, Ark.; H. H. Britton, supv'r., N. Y. C., Adrian, Mich.; J. F. Barron, rdm., Sou., Selma, Ala.; R. L. Fox, rdm., Sou., Alexandria, Va.; N. Bridges, rdm., A. T. & S. F., Newton, Kan.; T. A. Gregory, rdm., N. P., Minneapolis, Minn.; E. E. Edwards, rdm., S. P., Oakridge, Ore.; C. M. Hayes, gen'l. rdm., M. St. P. & S. S. M., Minneapolis, Minn.; H. E. Kirby, asst. engr., C. & O., Richmond, Va.; and J. C. Runyon, supv'r., C. & O., Covington, Ky.

Supply Trade News

General

The Independent Pneumatic Tool Company, Chicago, will move its Philadelphia, Pa., branch into its newly constructed building at Seventeenth and Fairmount avenues. The company has also recently completed a $500,000 plant in Los Angeles, Cal.

The Ardco Manufacturing Company has moved from its plant in Jersey City, N. J., into larger quarters at 1116 Paterson Plank Road, North Bergene, N. J.

Personal

Roy P. Williamson has been appointed sales manager of the jack division of the **Buda Company,** Harvey, Ill.

E. H. Weigman, who was appointed sales manager for the **Grip Nut Company** on January 1, 1941, has now been elected vice-president in charge of sales, with headquarters in Chicago. **John D. Ristine** has been appointed assistant to the president, with headquarters at Chicago, and **Erastus Emery** has been appointed eastern district sales manager, with headquarters at Pittsburgh, Pa.

Howard P. DeVilbiss and **Roy A. Guyer** have been elected vice-presidents of the **DeVilbiss Company,** Toledo, Ohio. Mr. DeVilbiss, son of the founder, has been active in the company since his father's death in 1928 and Mr. Guyer has been sales manager of the spray painting division.

The Chipman Chemical Company, Inc., Bound Brook, N. J., has constructed a plant at Portland, Ore., for the preparation of weed killing chemicals. **Keith Sime** has been appointed northwest representative, with headquarters at Portland. This new plant has for its source of sodium chlorate and other chlorate products, the chemical manufacturing plant of the Pennsylvania Salt Manufacturing Company, which was built to take advantage of the power from Bonneville Dam. The new Chipman plant will supply railroads in the northwest.

Lucius (Lou) Booth Sherman, senior vice-president of the Simmons-Boardman Publishing Corporation, with headquarters at Chicago, has retired on pension after more than 50 years' association with

Lucius Booth Sherman

the railroads and the railway supply industry. Mr. Sherman was born in Chicago on April 18, 1863, and after attending the University of Chicago, he immediately chose the selling phase of the publishing business for his career. In 1884 he entered the employ of the Railway Review and soon after rose to business manager of that publication. Later he resigned to become associated with the Railroad Gazette, and on November 1, 1901, was promoted to western manager of that publication. In 1908 the *Railway Age* and the Railroad Gazette were merged into the Railroad Age Gazette, and Mr. Sherman was elected vice-president of the new company on May 9, 1911. When the Simmons-Boardman Publishing Company was formed in 1912 to publish the *Railway Age* and several other railway publications, he was made vice-president of that company, and later was elected its senior vice-president.

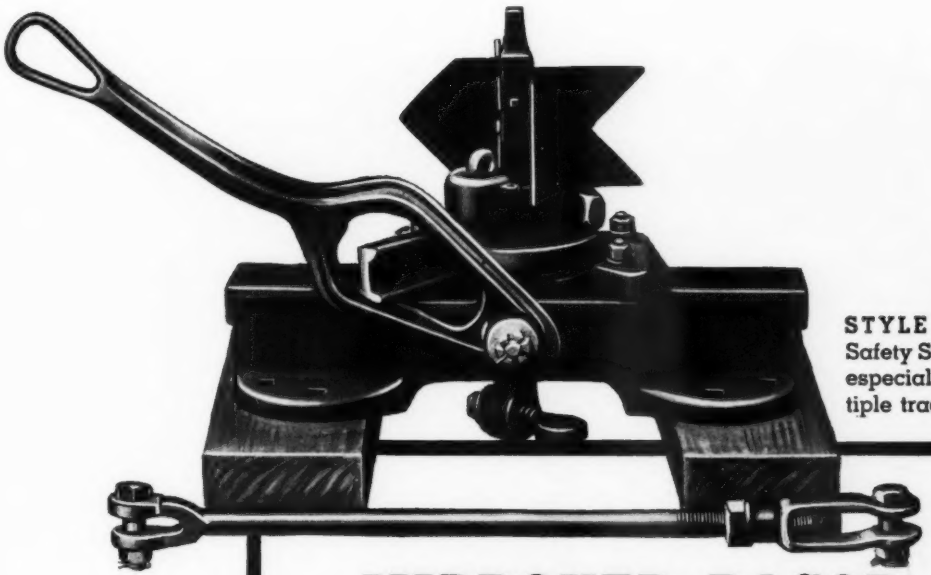
Mr. Sherman served actively in the Railway Manufacturers Supply Association as a member of the executive committee, and also, for a number of years, as a director of the National Railway Appliances Association. In 1925 he was one of the American Railway Association's delegates to the International Railway Congress at London, England.

Clarence C. Rausch, who has been affiliated with the **Dearborn Chemical Company,** Chicago, for 20 years, has been promoted to assistant vice-president in charge of NO-OX-ID sales to railways, with headquarters at Chicago. During the last 10 years, he has devoted his time to the promotion of NO-OX-ID rust preventive in the railway industry. Prior to his service with the Dearborn Chemical Company, he spent four years in the operating department of the Pennsylvania.

Clarence C. Rausch

Alex S. Anderson, whose appointment as district manager for the midwestern territory of the Duff-Norton Manufacturing Company, with headquarters at Chicago, was announced in the January issue, was educated in the public schools of Detroit, Mich. He went to work in the shops of the Detroit Shipbuilding Company and later was transferred to office work. In 1908, Mr. Anderson went with Adams & Westlake, as a representative contacting the shipbuilding and railroad trades at Philadelphia, Pa. Three years later he was transferred to the western territory, with headquarters at Chicago, and in 1927 he was elected vice-president, which position he held until his appointment as district manager for the Duff-Norton Manufacturing Company.

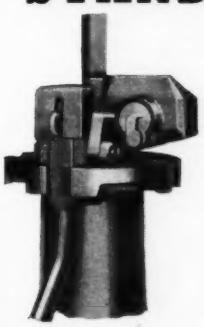
Alex S. Anderson



STYLE 20B—Automatic Safety Stand with low target especially designed for multiple track locations.

IMPROVED RACOR AUTOMATIC SAFETY SWITCH STANDS

The automatic safety feature, built into these stands as part of the base mechanism, makes it impossible to damage either stands or switch points if trailed through when set in closed position. These stands are always ready to work as a hand throw. Position of points is always indicated by targets or lamps, while they cannot remain in partially open position.



View of Eversure Lock Furnished when specified.

STYLE 17C—An efficient main line switch. Hand lever cannot be disengaged from bracket. Eversure lock may be used on this stand preventing loss of padlocks.

RACOR

RAMAPO AJAX DIVISION

THE AMERICAN BRAKE SHOE & FOUNDRY CO. • 230 Park Ave., New York

TO RAILWAY SUPPLY MANUFACTURERS

"Building for Tomorrow"

"Boss, we're certainly sitting in the driver's seat now. These railways are going to come to us this year," said the star railway salesman to his sales manager.

"That's possibly true, Bill—but I don't like it."

"You don't like it! How do you figure that out? It ought to be a relief after what we've been going through."

"That's what I'm afraid of. It's dynamite for us."

"How so, Boss?"

"It's simple, Bill. You and I've worked hard for years to develop recognition for our goods. And we've succeeded pretty well, you'll admit."

"That's right, Boss, and that's why they're coming to us now."

"True, Bill, and that's the reason why we can't afford to lose them. We've got to work closer with them than ever before, getting partial deliveries for them where we can, telling them when they can expect the rest of their shipments and above all, letting them know that we're trying to help them in every way that we can."

"That's a big order, Boss."

"But that's the job that's cut out for us. And what's more, we're going to continue to reach them with our story through our advertising in Railway Engineering and Maintenance too."

"What can we do there, Boss?"

"A lot, Bill. Look at aluminum. It's the No. 1 material for defense purposes. Yet the Aluminum Company is carrying larger space than usual to tell its customers what it is doing to increase its output so that it can soon meet their needs."

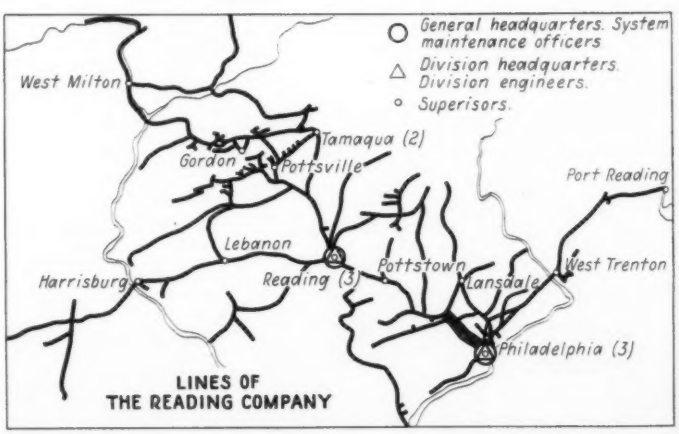
"You mean, Boss, that they're spending money for advertising when they're swamped with orders they're unable to fill?"

"That's their program, Bill. And it's a smart one, too, for it'll show their customers that they're doing the best they can to meet their needs and will keep them friendly until they can meet their needs."

"Well, Boss, when a company as big and as successful as the Aluminum Company does this, it ought to be a good tip for us."

"That's the way I feel, Bill. And that's the reason I'm insisting on continuing our advertising. It'll make friends for us today and build business for us tomorrow."

Railway Engineering and Maintenance Goes Every Month to the Engineer Maintenance of Way, to the **3 Division Engineers, to the 13 Supervisors and to 22 Foremen and Other Local Subordinate Maintenance Officers** Who Are in Training for Promotion to Supervisory Positions on the Reading.



RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

STONHARD at work

Ruts and holes had been an annoyance here because traffic could not be tied up long enough to make repairs with ordinary materials . . . . then they heard about STONHARD.

Without chipping the old surface, they made a complete week-end overlay of STONHARD RESURFACER—the resilient, non-skid, long lasting railroad resurfacing material. In use by over 100 Railroads the world over. Your railroad repair problems can be quickly overcome.

STONHARD COMPANY, R. R. Division

401 N. Broad St. Philadelphia, Pa.

Quick shipments from any part of the United States

EASY TO READ MARKINGS THAT ARE DURABLE

Lufkin Chrome Clad Steel Tapes are today's outstanding value. Jet black markings are easy to read against the satin chrome surface that won't rust, crack, chip or peel.

WRITE FOR CATALOG

NEW YORK 106 Lafayette St. **THE LUFKIN RULE CO.** SAGINAW, MICHIGAN Canadian Factory WINDSOR, ONT.

TAPES — RULES — PRECISION TOOLS

How Much Is A Shovel-Full?

Do You Know That These Form Tying Methods Are As Up-To-Date As The Most Modern Diesel Shovel?

Of course a gang of shovel-wielders could nibble out that excavation for you. And don't laugh at the idea!

RICHMOND 10-WAY PROFIT PLAN

1—Over 38 different form tying devices to choose from.
2—Always cost less to use than wire, band or rod ties.
3—Engineered for safe working loads of 1300 to 25000 lbs.
4—Faster erecting and stripping plus big lumber savings.
5—Promotes perfect alignment for correct wall thickness.
6—Protects job against rust staining with "1 to 2" "hold-back."
7—Scientifically reduced weight, saves shipping and handling costs.
8—Only known prevention against termite destruction.
9—You borrow working parts paying only for ties in the job.
10—Free estimating service specifying job quantities needed.

The chances are, that if you're not using Richmond you're still in "the pick and shovel era" on your concrete form work.

Thousands of contractors, all over the country, use Richmond on every job. Money is the only reason. Money saved on the job. Money in pocket. Once you, too, begin to rely on Richmond, your "take" on concrete jobs is bound to be a lot better. Richmond's 10-way profit plan guarantees it!

FREE ESTIMATING SERVICE

By 13 especially experienced engineers to tell you exactly how many ties are needed, what kind, how to do the job fast for extra profit. Plus 9 other "profit-savers" features in our 10-way profit plan.

For complete product information see our pages in Sweets Catalog Engineering & Contractors and Architectural Sections or write direct to Dept. R.

RICHMOND SCREW ANCHOR COMPANY, INC.

816 LIBERTY AVENUE, BROOKLYN, N. Y.

New Toro POPULAR PRICED POWER MOWERS

THESE new STARLAWN mowers represent the latest engineering trend. Steel construction . . . stronger . . . less weight . . . easier handling . . . smoother cutting.

3 SIZES—24, 27 and 30 INCH

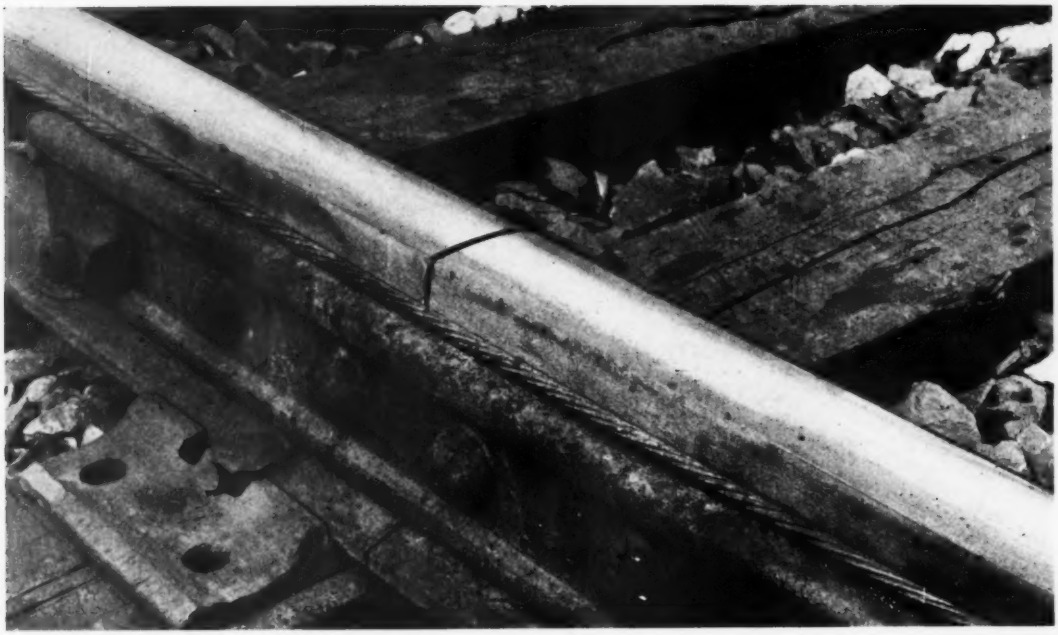
SEND FOR BEAUTIFUL 24-PAGE CATALOG

TORO MANUFACTURING CORPORATION

Minneapolis Minnesota

Mowing Machinery Specialists for Over Twenty Years

ALPHABETICAL INDEX TO ADVERTISERS



STRIP WELDING

Reduces Costs of Building Up Battered Rail Ends

STRIP WELDING is acclaimed to be the simplest and most economical method of building up battered rail ends. In the first place it is progressive, in a straight line, and thus avoids the reheating or softening effect of full ball welding.

Secondly the welding is limited to a centrally located riding strip, 1/3 to 1/2 the width of the rail head. Naturally this means a big saving in time and materials.

The method of application is easily learned. There is no lost time in changing from full ball to STRIP WELDING. The welds can be applied by oxy-acetylene process or electric arc method with the same materials and equipment used in full ball welding.

Naturally the surface finish is a very important factor and precision grinding is recommended. For this vital operation we are prepared to furnish a STRIP GRINDER ATTACHMENT which not only assures maximum precision but also big savings in time.

For full information on instruction and service in connection with the STRIP WELDING PROCESS address your communication to

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